



## **Memorandum of Understanding**

**between**

**Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology, India**  
**and**  
**Concordia University, Canada**

With the objective of promoting academic linkages between the Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology (“Vel Tech”) and Concordia University, Montreal, (“Concordia”), the undersigned have agreed to the following:

### **1. Framework for Specific Agreement**

This Memorandum of Understanding (“MOU”) will serve as a framework for specific collaborative initiatives to be developed jointly by the faculties of Concordia and their counterparts at Vel Tech.

### **2. Areas of Collaboration**

Both parties have agreed to explore and implement mutually rewarding viable initiatives focused on, among others, the following areas of academic cooperation:

- 2.1** Pathway agreements;
- 2.2** Internship exchanges;
- 2.3** Co-sponsorship of academic projects and conferences;
- 2.4** Sharing of scientific information on areas of mutual interest;
- 2.5** Other academic collaboration including faculty exchange.

### 3. Development of Initiatives

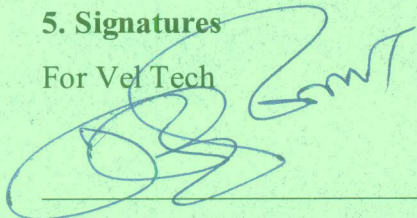
Academic cooperation will be defined and developed between Vel Tech and Concordia, forming the basis for an agreement of academic collaboration. Credited courses will be examined for compatibility in the case of pathway agreements.

### 4. Implementation and Duration of the MOU

This MOU will remain in effect for a period of two (2) years from the date of signing. Within the above-mentioned areas, Vel Tech and Concordia will endeavor to define precisely initial areas of collaboration and collaborators within six (6) months of the signing of this MOU. Upon the consent of both parties, a full agreement of academic cooperation will then be negotiated and implemented.

### 5. Signatures

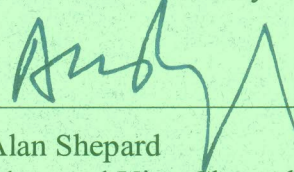
For Vel Tech



Col. Prof. Dr. R. Rangarajan  
Founder Chancellor & President

Date: June 26, 2018.

For Concordia University



Dr. Alan Shepard  
President and Vice-Chancellor

Date: June 14, 2018



**Vel Tech**  
Rangarajan Dr. Sagunthala  
R&D Institute of Science and Technology  
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

**Concordia University, Canada**

| Name of the Research Institute / University / Organization | Country | Duration of the Agreement | Academic Year | Date of Signing | Date of Expiry | Purpose / Activities                                                                                                                                                                                                   |
|------------------------------------------------------------|---------|---------------------------|---------------|-----------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Concordia University                                       | Canada  | 2 Years                   | 2018-19       | 26.06.2018      | 25.06.2020     | Pathway Agreements; Internship Exchanges; Co-sponsorship of Academic Projects and Conferences; Sharing of Scientific Information on areas of mutual interest; Other academic collaborations including faculty exchange |

**Actual Activities with Concordia University, Canada**

|                     |                                                                                                        |
|---------------------|--------------------------------------------------------------------------------------------------------|
| <b>A.Y. 2017-18</b> | Faculty Mobility (Incoming - Short Courses) - 1<br>Vel Tech Delegates visited Concordia University - 2 |
| <b>A.Y. 2018-19</b> | Delegates Visited Vel Tech - 1                                                                         |

  
**MoU Coordinator**



**Dean - International Relations**

  
**Dr. P. Suresh**  
Dean - International Relations

**Vel Tech**  
Rangarajan Dr. Sagunthala  
R&D Institute of Science and Technology  
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)



**Veltech Dr.RR & Dr.SR University<sup>®</sup>**  
(Estd. u/s 3 of UGC Act, 1956)

**School of Mechanical & Construction**  
**Department of Mechanical Engineering**

**Specialized one credit course on**  
**“Fundamentals of Vibrations”**  
**(1157CS916)**

**by**  
**Prof. Dr. Rama Bhat**  
**Concordia University, Canada**



**Held on**  
**Date: February 5 to 16, 2018**

## **FACULTY -- Dr. Rama Bhat**

Department of Mechanical Engineering  
Concordia University  
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## **BIOGRAPHY**

### **Degrees held**

- B.Eng. (Mechanical), University of Mysore, India, 1966.
- M.Tech. (Mechanical), Indian Institute of Technology, Madras, India, 1968
- Ph.D. (Mechanical), Indian Institute of Technology, Madras, India, 1973.

### **Honours and awards**

- An award by NASA Langley Research Center for the work on "PROSSS PROGRAMMING STRUCTURED SYNTHESIS SYSTEM", April 14, 1983
- Elected Fellow of Institution of Engineers (India), 1984
- Elected Fellow of American Society of Mechanical Engineers, 1992
- Elected Fellow of Acoustical Society of India, 1994
- Honorary Fellow of the Academy of General Education, Manipal, India, 1987
- Invited to visit educational and research institutions in India under United Nations Development Program in 1986

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## **COURSE INFORMATION**

## Undergraduate

- [MECH 443](#): Mechanical Vibrations
- [MECH 431](#): Principles of Aeroelasticity
- [ENGR 274](#): Modelling and Analysis of Physical Systems
- [ENGR 243](#): Dynamics
- [EMAT 391](#): Numerical Methods in Engineering
- [ENGR 221](#): Materials Science
- [ENGR 213](#): Technical Drawing
- [MECH 211](#): Mechanical Engineering Drawing

## Graduate

- [ENGR 631](#): Mechanical Vibrations
- [MECH 648](#): Principles of Aeroelasticity
- [MECH 630](#): Vibration Problems in Rotating Machinery
- [MECH 690](#): Modal Analysis in Mechanical Systems & Applications
- [ENGR 733](#): Random Vibrations
- [ENGR 630](#): Advanced Dynamics

## RESEARCH INTERESTS

Random vibrations, rotor dynamics, structural acoustics, micromechatronics.

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## PUBLICATIONS

- Total Number of Refereed Journal Publications: 90
- Total Number of Refereed Conference Publications: 91
- Total Number of Other Publications: 3
- Total Number of Books Published: 3
- Total Number of Contributions to Books: 2

## List of refereed journal publications

1. R.B. Bhat, "Curve Veering Behavior of Some Vibrating Systems" Accepted for publication in Shock and Vibration, Manuscript SAV-00-003, 2000
2. S. Chakraverty, R.B. Bhat and I. Stiharu, "Transverse Vibration of Annular Elliptic Plates with Rectangular Orthotropy using Two Dimensional Orthogonal Polynomials», Accepted for publication, Journal of Applied Mechanics and Engineering, February 10, 2000
3. S. Chakraverty, I. Stiharu and R.B. Bhat, Influence of Aerodynamic Forces and Moments on the Flight Trajectory of a Spinning Spherical Projectile", accepted for publication, AIAA Journal, 20 June 2000
4. P. Muthukumaran, I. Stiharu and R.B. Bhat, "Gas Phase Xenon Diflouride Etching of Microsystems Fabricated Through the MITEL 1.5  $\mu$ m CMOS Process", Canadian Journal of Electrical and Computer Engineering, Vol. 25, No. 1, 2000
5. P. Muthukumaran, R.B. Bhat and I. Stiharu, "Boundary Conditioning for Structural Tuning Using Fuzzy Logic Approach", Journal of Computers and Structures, Vol. 74, 2000, pp. 547-557.
6. S. Chakraverty, R.B. Bhat and I. Stiharu, "Recent Research on Vibration of Structures Using Boundary Characteristic Orthogonal Polynomials in the Rayleigh-Ritz Method", The Shock and Vibration Digest, Vol. 31(3), 1999, pp. 187-194
7. M. Packirisamy, R.B. Bhat and I. Stiharu, "Boundary Conditioning Technique for Structural Tuning", Journal of Sound and Vibration, Vol. 220(5), 1999, pp. 847-859.
8. C. Rajalingham, R.B. Bhat and S. Rakheja, "Automatic Balancing of Flexible Vertical Rotors Using a Guided Ball", International Journal of Mechanical Sciences, Vol. 40(9), 1998, pp. 825-834.
9. P. Muthukumaran, R.B. Bhat and I. Stiharu, "Localization of Structural Vibration and Acoustic Radiation Through Boundary Conditioning", Transactions of CSME on Mechanics of Solids and Structures, Vol. 22(4B), 1998, pp. 519-532.
10. Bhat R.B., Chakraverty S. And Stiharu I., "Recurrence Scheme for the Generation of Two Dimensional Boundary Characteristic Orthogonal Polynomials to Study Vibration of Plates", Journal of Sound and Vibration, Vol. 216(2), 1998, pp. 321 - 327.

11. Rajalingham C. and Bhat R.B., "Influence of Electric Field on Diaphragm Stability and Vibration in a Condenser Microphone", Journal of Sound and Vibration, Vol. 211(5), 1998, pp. 819-827.
12. Rajalingham C., Bhat R.B. and Xistris G.D., "Vibration of Circular Membrane Backed by Cylindrical Cavity", International Journal of Mechanical Sciences, Vol. 40 (8), 1998, pp. 723 -734.
13. Rajalingham C., Bhat R.B. and Xistris G.D., "Separable Solutions of Plate Vibration Equations by Reduction to Simultaneous Ordinary Differential Equations", Mechanical Engineering Journal, The Institution of Engineers (India), Vol. 78, 1997, pp. 94-100.
14. Rao C., Bhat R.B. and Xistris G.D., "Simultaneous Forward and Backward Whirling in a Jeffcott Rotor on Dissimilar Hydrodynamic Bearings", Journal of Sound and Vibration, Vol. 203(4), 1997, pp. 707-716.
15. Rajalingham C., Bhat R.B. and Xistris G.D., "Vibration of Rectangular Plates by Reduction of Plate Partial Differential Equation into Simultaneous Ordinary Differential Equations", Journal of Sound and Vibration, Vol. 203(1), 1997, pp. 169-180.
16. Bhat R.B., "Nature of Stationarity of the Natural Frequencies at the Natural Modes in the Rayleigh Ritz Method Method", Journal of Sound and Vibration, Vol. 203(2), 1997, pp. 251-263.
17. Rao C., Bhat R.B. and Xistris G.D., "Experimental Verification of Simultaneous Forward and Backward Whirling at Different Points of a Jeffcott Rotor Supported on Identical Journal Bearings", Journal of Sound and Vibration, Vol. 198(3), 1996, pp. 379-388.
18. Rajalingham C., Bhat R.B. and Xistris G.D., "Closed Form Approximation of Vibration Modes of Rectangular Plates by the Variational Reduction Method", Journal of Sound and Vibration, Vol. 197(3), 1996, pp. 263-281.
19. Rajalingham C., Bhat R.B. and Xistris G.D., "Vibrations of Rectangular Plates Using Plate Characteristic Functions as Shape Functions in Rayleigh-Ritz Method", Journal of Sound and Vibration, Vol. 193(2), 1996, pp. 497-509.
20. Bhat R.B., "Effect of Normal Mode Contents in Assumed Deflection Shapes in Rayleigh- Ritz Method", Journal of Sound and Vibration, Vol. 189(3), 1996, pp. 407-419.

21. Grossi R.O. and Bhat R.B., "Natural Frequencies of Edge Restrained Tapered Rectangular Plates", *Journal of Sound and Vibration*, Vol. 185(2), 1995, pp. 335-344.
22. Thomas C., Rakheja S., Bhat R.B. and Stiharu I., "A Study of the Modal Behaviour of the Human-Hand-Arm System", *Journal of Sound and Vibration*, Vol. 191(1), 1995, pp. 171- 176.
23. Sakata T., Takahashi K. and Bhat R.B., "Natural Frequencies of Orthotropic Rectangular Plates Obtained by Iterative Reduction of Partial Differential Equation", *Journal of Sound and Vibration*, Vol. 189(1), 1996, pp. 89-101
24. Rajalingham C., Bhat R.B. and Xistris G.D., "Natural Vibration of a Cavity Backed Rectangular Plate Using a Receptor-Rejector System Model", *Journal of Vibration and Acoustics, Transactions of ASME*, Vol. 117(4), 1995, pp. 416-423.
25. Mundkur G., Bhat R.B. and Neriya S.V., "Vibrations of Plates with Cut-outs Using Boundary Characteristic Orthogonal Polynomial Functions", *Journal of Sound and Vibration*, Vol. 176(1), 1994, pp. 136-144.
26. Rajalingham C., Bhat R.B. and Xistris G.D., "A Note on Elliptical Plate Vibration Modes as a Bifurcation from Circular Plate Modes", *International Journal of Mechanical Sciences*, Vol. 37(1), 1995, pp. 61-75.
27. Cherian T., Rakheja S. and Bhat R.B., "An Analytical Investigation of an Energy Flow Divider to Attenuate Hand Transmitted Vibration", *International Journal of Industrial Ergonomics*, Vol. 17, 1996, pp. 455-467.
28. Rajalingham C., Bhat R.B. and Xistris G.D., "Influence of Thermal Conduction Across the Fluid Film on the THD Characteristics of a Plain Journal Bearing", *Journal of Tribology, Transactions of ASME*, Vol. 116, 1994, pp. 397-399.
29. Rajalingham C., Bhat R.B. and Xistris G.D., "Vibration of Clamped Elliptical Plate Using Exact Circular Plate Modes as Shape Functions in Rayleigh Ritz Method", *International Journal of Mechanical Sciences*, Vol. 36(3), 1994, pp. 231-246.
30. Grossi R.O., Aranda A. and Bhat R.B., "Vibration of Tapered Beams with One End Spring Hinged and the Other End with Tip Mass", *Journal of Sound and Vibration*, Vol. 160(1), 1993, pp.175-178.
31. Stiharu I., Demian T. and Bhat R.B., "Mixed Lubrication Model for Microbearings Containing Microasperities of Defined Geometry", *Wear Journal*, Vol. 172, 1994, pp. 1-10.

32. Bhat R.B., Singh J. and Mundkur G., "Plate Characteristic Functions and Natural Frequencies of Vibration of Plates by Iterative Reduction of Partial Differential Equation", *Journal of Vibration and Acoustics, Transactions of ASME*, Vol. 115(2), 1993, pp.177-182.
33. Rajalingham C., Bhat R.B. and Xistris G.D., "Influence of Shaft Material Damping on the Stress Fluctuations in a Rotor Supported on Fluid Film Bearings", *Journal of Society of Tribologists and Lubrication Engineers*, Vol. 36(4), 1993, pp. 707-713.
34. Rajalingham C., Bhat R.B. and Xistris G.D., "Influence of External Damping on the Stability and Response of a Horizontal Rotor with Anisotropic Bending Stiffness", *Journal of Society of Tribologists and Lubrication Engineers*, Vol. 36, 1993, 393-398.
35. Rajalingham C., Bhat R.B. and Xistris G.D., "Natural Frequencies and Mode Shapes of Elliptic Plates with Boundary Characteristic Orthogonal Polynomials as Assumed Shape Functions", *Journal of Vibrations and Acoustics, Transactions of ASME*, Vol. 115, 1993, 353-358
36. Bhat R.B., "Acoustics of Conch Shells", *Journal of Sound and Vibration*, Vol. 157(1), 1992, 190-191.
37. Dhir A., Sankar S. and Bhat R.B., "Nonlinear Ride Analysis of Heavy Vehicles Using Local Equivalent Linearization Technique", *International Journal of Vehicle Design*, Vol. 13(5&6), 1992.
38. Rajalingham C., Bhat R.B. and Xistris G.D., "Influence of Support Flexibility and Damping Characteristics on the Stability of Rotors Having Stiffness Anisotropy in the Direction of the Shaft Principal Axes", *International Journal of Mechanical Sciences*, Vol. 34, 1992, 717-726.
39. Rajalingham, C. and Bhat, R.B., "Vibration of Elliptic Plates using Characteristic Orthogonal Polynomials in Rayleigh-Ritz Method", *International Journal of Mechanical Sciences*, Vol. 33, 1991, pp. 705-716
40. Bhat, R.B. and Mundkur, G., "Vibration of Plates using Plate Characteristic Functions obtained by Reduction of Partial Differential Equation", *Journal of Sound and Vibration*, Vol. 159(2), 1992, 157-171
41. Rajalingham C. and Bhat, R.B., "Axisymmetric Vibrations of Circular Plates and its Analog in Elliptic Plates using Characteristic Orthogonal Polynomials", *Journal of Sound and Vibration*, Vol. 159, 1992, 109-117

42. Grossi R.O. and Bhat, R.B., "A Note on Vibrating Tapered Beam", Journal of Sound and Vibration, Vol. 147(1), 1991, pp. 174-178.
43. Gurram, R., Bhat, R.B. and Rakheja, S., "Vibration Analysis of Structures Through Optimization of Coefficients and Exponent Parameters in Assumed Deflection Shapes", Journal of Sound and Vibration, Vol. 153(3), 1992, 543-547.
44. Rajalingham, C., Xistris, G.D. and Bhat, R.B., "Stability of Rotors Under Combined Influence of Fluid Film Bearing Characteristics and Shaft Material Damping", STLE Tribology Transactions, Vol. 35, 1992, 566-570.
45. Bhat, R.B., "Acoustics of a Cavity Backed Composite Membrane: The Indian Musical Drum", Journal of Acoustical Society of America, Vol. 90(3), 1991, pp. 1469-1474.
46. Bhat, R.B., "Vibration of Rectangular Plates on Point and Line Supports Using Characteristic Orthogonal Polynomials in Rayleigh-Ritz Method", Journal of Sound and Vibration, Vol. 149(1), 1991, pp. 170-172.
47. Rajalingham, C. and Bhat R.B., "Whirling Induced Stress Fluctuations in Single Disk Rotors Supported on Hydrodynamic Bearings", Journal of Sound and Vibration, Vol. 151(2), 1991, pp. 314-322.
48. Bhat, R.B., Laura, P.A.A., Gutierrez, R.G., Cortinez, V.H., and Sanzi, H.C., "Numerical Experiments on the Determination of Natural Frequencies of Transverse Vibrations of Rectangular Plates of Non-Uniform Thickness", Journal of Sound and Vibration, Vol. 138, 1990, pp. 205-219.
49. Rajalingham, C., Bhat, R.B., and Jha, V.K., "Stress Reversals in a Jeffcot Rotor Supported on Fluid Film Bearings", Transactions of Society of Tribology and Lubrication Engineers, Vol. 34, 1991, pp. 112-116.
50. Prabhu, B.S., Bhat, R.B. and Sankar, T.S., "Analytical Methods for Rotors Supported on Hydrodynamic Journal Bearings", Tribology Transactions, Vol. 33, 1990, pp. 60-66.
51. Subbiah, R., Bhat, R.B. and Sankar, T.S., "Dynamic Response of Rotors Using Modal Reduction Techniques", Journal of Vibration, Acoustics, Stress and Reliability in Design, Trans. ASME, Vol. 111, 1989, pp. 360-365.
52. Neriya, S.V., Bhat, R.B. and Sankar, T.S., "On the Dynamic Response of a Helical Geared Shaft System Subjected to a Static Transmission Error in the Form of

Deterministic and Filtered Noise Inputs", Journal of Vibration, Acoustics, Stress and Reliability in Design, Trans, ASME, Vol. 110, 1988, pp. 501-506.

53. Laura, P.A.A., Gutierrez, R.H. and Bhat, R.B., "Transverse Vibrations of a Trapezoidal Cantilever Plate of Variable Thickness", AIAA Journal, Vol. 27, 1988, pp. 921-922.
54. Bhat, R.B., "Flexural Vibration of Polygonal Plates Using Characteristic Orthogonal Polynomials in Two Variables", Journal of Sound and Vibration, Vol. 114, 1987, pp. 65-71.
55. Bhat, R.B., "Rayleigh-Ritz Method with Separate Deflection Expressions for Structural Segments", Journal of Sound and Vibration, Vol. 115(1), 1987, pp. 174-177.
56. Prabhu, B.S., Bhat, R.B. and Sankar, T.S., "Analysis of Deceleration Phenomenon of High Speed Rotor Systems", Mechanical Systems and Signal Processing, Vol. 1(3), 1987, pp. 293-299.
57. Neriya, S.V., Bhat, R.B., and Sankar, T.S., "Dynamic Response of a Geared Train of Rotors subjected to Random Support Excitations", Shock and Vibration Bulletin, No. 57, 1987, pp. 107-119.
58. Bhat, R.B., "Beam Characteristics Using Orthogonal Polynomials with Fractional Power Increments", Journal of Sound and Vibration, Vol. 112(3), 1986, pp. 556-558.
59. Bhat, R.B., "Application of Rayleigh-Ritz Method on the Finite Element Model of a Structure as a Means of Co-ordinate Reduction", Journal of Sound and Vibration, Vol. 108(2), 1986, pp. 355-356.
60. Bhat, R.B., "Transverse Vibrations of a Rotating Uniform Beam with Tip Mass Using Beam Characteristic Orthogonal Polynomials in Rayleigh-Ritz Method", Journal of Sound and Vibration, Vol. 104, No. 3, 1986, pp. 199-210.
61. Subbiah, R., Bhat, R.B. and Sankar, T.S., "Rotational Stiffness and Damp-ing Coefficients of Fluid Film in a Finite Cylindrical Bearing", Trans. ASLE, Vol. 29, 1986, pp. 414-422.
62. Bhat, R.B., Subbiah R. and Sankar, T.S., "Dynamic Behaviour of a Simple Rotor with Dissimilar Hydrodynamic Bearings by Modal Analysis", J. Vibrations, Acoustics, Stress and Reliability in Design, Trans. ASME, Vol. 107, 1985, pp. 267-269.

63. Bhat, R.B., "Component Mode Synthesis in Modal Testing of Structures", Journal of Sound and Vibration, Vol. 101, No. 3, 1985, pp. 271-272.
64. Subbiah, R., Bhat, R.B. and Sankar, T.S., "Response of Rotors Subjected to Random Support Excitations", J. Vibration, Acoustics, Stress and Reliability in Design, Trans. ASME Vol. 107, 1985, pp. 453-459.
65. Neriya, S.V., Bhat, R.B. and Sankar, T.S., "Coupled Torsional-Flexural Vibration of a Geared Shaft System Using Finite Element Analysis", Shock and Vibration Bulletin, No. 55, 1985, pp. 13-25.
66. Bhat, R.B., "Natural Frequencies of Rectangular Plates Using Characteristic Orthogonal Polynomials in Rayleigh-Ritz Method", Journal of Sound and Vibration, Vol. 102, No. 3, 1985, pp. 493-499.
67. Bhat, R.B., "Plate Deflections using Orthogonal Polynomials", Journal of Engineer-ing Mechanics, Trans. ASCE, Vol. 111, 1985, pp. 1301-1309.
68. Bhat, R.B., Subbiah, R. and Sankar, T.S., "Dynamic Behavior of a Simple Rotor with Dissimilar Hydrodynamic Bearings by Modal Analysis", Journal of Vibration, Acoustics, Stress and Reliability in Design, Vol. ♦ 107, 1985, pp. 267-269.
69. Bhat, R.B., "Steady State Response of Vibrating Systems to Periodic Pulse Excitation", AIAA Journal, Vol. 22, 1984, pp. 1340-1342.
70. Neriya, S.V., Bhat, R.B. and Sankar, T.S., "Effect of Coupled Torsional Flexural Vibration on a Geared Shaft System on the Dynamic Tooth Load", ♦ Shock and Vibration Bulletin, No. 54, 1984, pp. 67-75.
71. Bhat, R.B., "Obtaining Natural Frequencies of Elastic Systems by Using an Improved Strain Energy Formulation in the Rayleigh-Ritz Method", Journal of Sound and Vibration, Vol. 93, No. 1, 1984, 314-320.
72. Reddy, C.V.R., Bhat, R.B. and Rao, B.V.A., "A Note on the Reduction of Radiated Noise from a Cement Mill by the Application of Damping Treatment", Journal of Sound and Vibration, Vol. 91, 1983, pp. 601-603.
73. Subbiah, R., Bhat, R.B. and Sankar, T.S., "Unbalance Response of a Single Mass Rotor Mounted on Dissimilar Hydrodynamic Bearings", Shock and Vibration Bulletin, No. 53, 1983.
74. Jha, V.K., Sankar, T.S. and Bhat, R.B., "Computer Aided Synthesis of a Satellite Antenna Structure with Probabilistic Constraints", Shock and Vibration Bulletin, No. 53, 1983, pp. 79-90.

75. Jha, V.K., Sankar, T.S. and Bhat, R.B., "Dynamic Behaviour of a Satellite Antenna Structure to Random Excitation", Shock and Vibration Bulletin, No. 53, 1983, pp. 91-103.
76. Bhat, R.B., Xistris, G.D. and Sankar, T.S., "Dynamic Behavior of a Moving Belt Supported on an Elastic Foundation", Trans. ASME, J. Mechanical Design, Vol. 104, 1982, pp. 143-147.
77. Bhat R.B., Sharan A.M. and Sankar T.S., "Workpiece Response in Turning Due to ♦Spatially Moving Random Metal Cutting Forces", Mechanisms and Machine Theory Journal, Vol. 17, No. 4, 1982, pp. 249-254.
78. Bhat, R.B., Rao, J.S. and Sankar, T.S., "Optimum Journal Bearing Parameters for Minimum Rotor Unbalance Response in Synchronous Whirl", Trans. ASME, J. Mechanical Design, Vol. 104, 1982, pp. 339-344.
79. Bhat, R.B., "Vibration of Panels with Nonuniformly Spaced Stiffeners", Journal of Sound and Vibration, Vol. 84, No. 2, 1982, 449-452.
80. Rao, J.S., Bhat, R.B. and Sankar, T.S., "A Theoretical Study of the Effect of Damping on the Synchronous Whirl of a Rotor in Hydrodynamic Bearings", Trans. CSME, Vol. 6, No. 3, 1981, pp. 155-161.
81. Sobieszczanski-Sobieski, J. and Bhat, R.B., "Adaptable Structural Synthesis using Advanced Analysis and Optimization Coupled by a Computer Operating System", J. Aircraft, Vol. 18, No. 2, 1981, pp. 142-149.
82. Bhat, R.B. and Sankar, T.S., "Effect of Stiffener Arrangement on the Random Response of a Flat Panel", Shock and Vibration Bulletin, No. 51, 1981, pp. 81-87.
83. Bhat, Rama B. and Kulkarni, A.V., "Finite Element Solutions for Beams Using an Element Averaging Technique", Computers and Structures, Vol. 8, 1978, pp. 135-137.
84. Bhat, Rama B. and Sinha, P.K., "Forced Vibrations of Simply Supported Orthotropic Sandwich Plates", J. Acoustical Society of America, Vol. 61, No. 2, 1977, 428-435.
85. Bhat, Rama B. and Kulkarni, A.V., "Natural Frequencies of a Uniform Cantilever with Slender Tip Mass", AIAA Journal, Vol. 14, No. 4, 1976, pp. 536-537.
86. Bhat, Rama B. and Wagner, H., "Natural Frequencies of a Uniform Cantilever with Slender Tip Mass in the Axial Direction", J. Sound and Vibration, Vol. 46, No. 2, 1976, pp. 304-307.

87. Bhat, Rama B. and Rao, B.V.A., "Vibrations of an Orthotropic Disc Supported at the Inside Edge", J. Sound and Vibration, Vol. 45, No. 4, 1975, pp. 510-514.
88. Bhat, Rama B., Rao, B.V.A. and Wagner, H., "Response of Structure to Random Acoustic Excitation - An Experimental Study", J. Spacecraft and Rockets, Vol. II, 1974.
89. Bhat, Rama B., Rao, B.V.A. and Wagner, H., "Structural Response to Random Acoustic Excitation", J. Earthquake Engineering and Structural Dynamics, Vol. I, 1973.
90. Wagner, H. and Bhat, Rama B., "Linear Response of Elastic Plates to Actual Random Loads", Ingenieur Archiv, Vol. 39, No. 3, 1970, pp. 149-152.

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### **List of conference publications**

1. R.B. Bhat and I. Stiharu, "Disordered Dynamic Systems Resulting from Approximate Modeling and Analysis", Accepted for presentation in ASME International Mechanical Engineering Congress and Exposition, Orlando, Florida, Nov. 5-10, 2000.
2. A. Warsame, R.B. Bhat, ♦Noise Generation by Agitated Industrial Liquid Masses♦, Acoustics Week in Canada 2000, Sherbrooke, Quebec, Canada, September 28-29, 2000.
3. R.L. Woodcock, I. Stiharu and R.B. Bhat, ♦Decoupled Bending and In-plane Vibrations in Single Layer Composite Laminates♦, International Conference on Advances in Composites♦2000, Bangalore, India, 24-26, August, 2000
4. S. Chakraverty, R.B. Bhat and I. Stiharu, "Dynamic Stability of Micro diaphragms Under the Action of Non-linear Electrostatic Forces", International Machine Design and Production Conference, Cairo, Egypt, February 15-17, 2000.
5. P. Muthukumaran, I. Stiharu and R.B. Bhat, ♦Gas Phase Silicon Micromachining of MEMS Devices Fabricated Through an Industrial CMOS Process♦, Proceedings of the 2nd CanSmart Workshop on Smart Materials and Structures, Canadian Space Agency, St. Hubert, Quebec, 13-14 September 1999.
6. R. Ganesan, J.A. Selliah and R.B. Bhat, ♦Finite Element with Efficient Basis Functions For Vibration Analysis of Structures♦, Canadian Congress of Applied

Mechanics CANCAM 99, McMaster University, Hamilton, Ontario, May 30 - June 3, 1999.

7. R.B. Bhat, ♦Vibration of Structures Using Boundary Characteristic Orthogonal Polynomials in the Rayleigh-Ritz Method♦, 2nd International Symposium on Vibrations of Continuous Systems, Grindelwald, Switzerland, July 12-16, 1999.
8. R.B. Bhat and Y.B. Gessesse, ♦Tuning of Bells Using an External Structural Ring♦, National Symposium on Dynamics NASDYN ♦98, Indian Institute of Technology, Madras, India, August 7, 1998.
9. M. Packirisamy, R.B. Bhat and I. Stiharu, ♦Localization of Structural Vibration and Acoustic Radiation Through Boundary Conditioning♦, FORUM 98, Canadian Society for Mechanical Engineering, May 19-22, 1998.
10. M. Packirisamy, I. Stiharu and R.B. Bhat, ♦Vibration of Micromachined Condenser Microphone Plate Diaphragms in Electrostatic Fields♦, Proceedings of Canadian Congress of Applied Mechanics, CANCAM 97, June 1-5, 1997.
11. Stiharu I. and Bhat R.B., ♦Vibration of Microplates in Electrostatic Fields Using Rayleigh- Ritz Method♦, International Modal Analysis Conference, IMAC-XV, Orlando, Florida, February 3-6, 1997.
12. Bhat R.B., Ganesan N. and Bhat K.N., ♦Vibration of the Seismic Mass-Spring System in a Microaccelerometer♦, Pan American Congress of Applied Mechanics, PACAM V, San Juan, Puerto Rico, January 2-4, 1997.
13. Bhat R.B. and Stiharu I., ♦Micromachined Acoustic Intensity Sensor♦, SPIE♦s 1996♦ Symposium in Smart Materials, Structures and MEMS, Bangalore, India, December 11-14, 1996.
14. Bhat R.B. and Swarnamani S., "Measurement and Analysis of Sounds from Ghatam - An♦ Indian Classical Percussion Instrument", Proceedings of the Silver Jubilee National Symposium on Acoustics, Acoustical Society of India, December 21-23, 1995.
15. Rajalingham C. Bhat R.B. and Xistris G.D., "Influence of Dissimilarity of Fluid Film♦ Bearings on the Stability of Rotor Bearing Systems", Ninth World Congress on the Theory of Machines and Mechanisms, Milano, Italy, August-September 1995.

16. Patel J., Stiharu I., Bhat R.B., Landsberger L. and Kahrizi M., "Condenser Microphones with Square Shaped Micromachined Membranes", Canadian Society of Mechanical Engineering Forum, Montreal, Canada, June 27-29, 1994.
17. George G., Stiharu I., Bhat R.B., Landsberger L. and Kahrizi M., "Characterisation of the Boundary Conditions of Silicon Structures Anodically Bonded to Pyrex Glass", Canadian Society of Mechanical Engineering Forum, Montreal, Canada, June 27-29, 1994.
18. Balike M, Bhat R.B. and Rakheja S., "Noise Transmission through a Cavity Backed Flexible Plate with Elastic Edge Constraints", Third International Congress on Air and Structure Borne Sound and Vibration, Montreal, Canada, June 13-15, 1994.
19. Rajalingham C., Bhat R.B. and Xistris G.D., "Interior Noise in a Rectangular Cavity Subjected to Uniform External Excitation on Two Opposite Flexible Walls", Third International Congress on Air and Structure Borne Sound and Vibration, Montreal, Canada, June 13-15, 1994.
20. Taylor L.R., Prasad M.G. and Bhat R.B., "Acoustical Characteristics of a Conch shell Trumpet", 127th Meeting of the Acoustical Society of America, Cambridge, Massachusetts, June 5-9, 1994
21. Taylor L.R., Prasad M.G. and Bhat R.B., "Geometrical Modeling and Spectral Analysis of a Conch Shell Trumpet", Third International Congress on Air and Structure Borne Sound and Vibration, Montreal, Canada, June 13-15, 1994
22. Stiharu I., Bhat R.B., Landsberger L. and Kahrizi M., "Influence of the Stress State in Silicon on the Anisotropic Etching Process", SPIE Conference on Thin Films and Microstructures, Optics Quebec 93, Quebec City, Canada, 16-20 August 1993
23. Abdou G., Bhat R.B. and Stiharu I., "Process Planning and Scheduling of Micromachined Transducers", SPIE Conference on Thin Films and Microstructures, Optics Quebec 93, Quebec City, Canada, 16-20 August 1993
24. Kaushal A. and Bhat R.B., "A Comparative Study of Vibration of Plates with Cutouts Using the Finite Element and Rayleigh Ritz Method", 14th Canadian Congress of Applied Mechanics CANCAM'93, May 30-June 4, 1993.
25. Balike M., Bhat R.B. and Rakheja S., "Use of Plate Characteristic Functions to Evaluate Sound Transmission Loss through Cavity Backed Flexible Plate", 14th Canadian Congress of Applied Mechanics CANCAM'93, May 30-June 4, 1993.

26. Balike M., Bhat R.B. and Rakheja S., "Plate Characteristic Functions to Evaluate Sound Transmission Loss Through Cavity Backed Flexible Plate", International Congress on Noise and Vibration Control, NOISE-93, St. Petersburg, Russia, May 31-June 3, 1993.
27. Rajalingham C. Bhat R.B., "Optimum System Parameters of Jeffcot Rotor Supported on Fluid Film Bearings Considering Energy Dissipation at Critical Speeds", National Seminar on Frontiers of Tribology and Condition Monitoring, Madras, India, June 1993.
28. Rajalingham C., Bhat R.B. and Xistris G.D., "Influence of External Damping on the Stability and Response of Horizontal Rotor with Anisotropic Bending Stiffness" ASME- STLE Tribology Conference, San Diego, October 18-21, 1992.
29. Bhat R.B. and Mundkur G., "Plate Characteristic Functions to Study Sound Transmission Loss Through Panels", Second International Congress on Recent Developments in Air and Structure-Borne Sound and Vibration, Auburn University, March 4-6, 1992.
30. Bhat R.B., "Studies on the Cavity Geometry and Sound Characteristics of a Conch Shell", National Symposium on Acoustics, I.I.T. Madras, December 12-14, 1992.
31. Rajalingham C., Bhat R.B. and Xistris G.D., "Influence of Shaft Material Damping on the Stress Fluctuations in a Rotor Supported on Fluid Film Bearings", 47th Annual Meeting of Society of Tribologists and Lubrication Engineers, Philadelphia, May 4- 7, 1992.
32. Rajalingham, C., Xistris, G.D. and Bhat, R.B., "Stability of Rotors Under the Combined Influence of Fluid Film Bearing Characteristics and Shaft Material Damping", STLE - ASME Tribology Conference, St. Louis, Missouri, October 13-16, 1991.
33. Rajalingham, C., Bhat, R.B. and Xistris, G.D., "Natural Frequencies and Mode Shapes of Elliptic Plates with Boundary Characteristic Orthogonal Polynomials as Assumed Shape Functions", Thirteenth Biennial ASME Conference on Mechanical Vibration and Noise, Miami, Florida, September 22-25, 1991.
34. Rajalingham, C., Bhat, R.B. and Xistris, G.D., "Influence of Thermal Conductivity of Lubricant on the THD Characteristics of a Plain Journal Bearing", Thirteenth Biennial ASME Conference on Mechanical Vibration and Noise, Miami, Florida, September 22-25, 1991.

35. Rajalingham, C., Bhat, R.B. and Jha, V.K., "An Indicator of Severity of Stress Fluctuations in a Jeffcot Rotor Supported on Fluid Film Bearings", Eighth World Congress on the Theory of Machines and Mechanisms, Prague, Czechoslovakia, Aug. 26-31, 1991.
36. Dhir, A., Sankar, S. and Bhat, R.B., "Vehicle Dynamic Simulation Using Local Equivalent Linearization Technique", 13th Canadian Congress of Applied Mechanics, Winnipeg, Manitoba, June 2-6, 1991.
37. Neriya, S., Bhat, R.B. and Sankar, T.S., "Dynamic Tooth Load and Response of a Torsion-Flexure Coupled Geared Shaft System due to Internal Excitations", ASME Mechanisms Conference, Chicago, Illinois, Sept. 16-19, 1990.
38. Rajalingham, C., Bhat, R.B. and Jha, V.K., "Stress Fluctuations in a Jeffcot Rotor Supported on Fluid Film Bearings", Proceedings of the International Conference on Hydrodynamic Bearing - Rotor System Dynamics (IC-HBRSD), Xian Jiaotong University, Xian, China, Sept. 17-21, 1990.
39. Rajalingham, C., Bhat, R.B. and Jha, V.K., "Stress Reversals in a Jeffcot Rotor Supported on Fluid Film Bearings", Annual Meeting of Tribologists and Lubrication Engineers, Denver, Colorado, May 7-10, 1990.
40. Rajalingham, C., Bhat, R.B. and Jha, V.K., "Simultaneous Backward and Forward Whirling Motion of Disk and Journal in a Jeffcot Rotor Supported on Fluid Film Bearings", 60th Shock and Vibration Symposium, Virginia Beach, VA, Nov. 14-16, 1989.
41. Bhat, R.B., "Natural Frequencies of Edge Restrained Tapered Plates Using Boundary Characteristic Orthogonal Polynomials", Twelfth Biennial ASME Conference on Mechanical Vibration and Noise, Montreal, Canada, September 17-20, 1989.
42. Subbiah, R., Bhat, R.B. and Sankar, T.S., "Dynamic Response of Rotors Using Modal Reduction Techniques", Twelfth Biennial ASME Conference on Mechanical Vibration and Noise, Montreal, Canada, September 17-20, 1989.
43. Neriya, S.V., Bhat, R.B. and Sankar, T.S., "Stability Analysis of Force Coupled Motion in Helical Geared Rotor Systems", Twelfth Biennial ASME Conference on Mechanical Vibration and Noise, Montreal, Canada, September 17-20, 1989.
44. Kaushal, A. and Bhat, R.B., "Tangential Velocity Effect on the Dynamic Behaviour of Turbine Blades", Twelfth Biennial ASME Conference on Mechanical Vibration and Noise, Montreal, Canada, September 17-20, 1989.

45. Khan, B.M. and Bhat, R.B., "Response of a Servomechanism Controlled Swinging Arm Actuator for Head Positioning in Magnetic Storage Devices", Twelfth Biennial ASME Conference on Mechanical Vibration and Noise, Montreal, Canada, September 17-20, 1989.
46. Kaushal, A. and Bhat, R.B., "Axisymmetric Vibrations of Rotating Circular Plates Using Characteristic Orthogonal Polynomials", Twelfth Canadian Congress of Applied Mechanics, Ottawa, Canada, May 28-June 2, 1989
47. Khan, B.M, Neriya, S.V. and Bhat, R.B., "Response of a Servomechanism Controlled Rotary Actuator Subjected to Step Input and a Sinusoidal Track Runout", I Pan American Congress of Applied Mechanics, Rio de Janeiro, Brazil, Jan. 3-6, 1989.
48. Neriya, S.V., Bhat, R.B. and Sankar, T.S., "Fatigue Analysis of Geared Rotor Systems", ASME 20th Biennial Mechanisms Conference, September 25-28, 1988, Orlando, Florida.
49. Kaushal, A. and Bhat, R.B., "Lateral Vibrations of Rotating Cantilever Beams Using Beam Characteristic Polynomials in Reissner Method", Second International Symposium on Transport Phenomena, Dynamics, and Design of Rotating Machinery, Honolulu, Hawaii, April 4-6, 1988.
50. Neriya, S.V., Bhat, R.B. and Sankar, T.S., "On the Dynamic Response of a Helical Geared Shaft System Subjected to a Static Transmission Error in the Form of Deterministic and Filtered White Noise Inputs", 11th ASME Conference on Mechanical Vibrations and Noise, September 27-30, Boston, 1987.
51. Bhat, R.B., "Condition Based Maintenance of Rotating Machinery", Indian Plant Engineers Annual Convention, Madras, Jan. 9-10, 1987.
52. Neriya, S.V., Bhat, R.B., Sankar, T.S., "Dynamic Response of a Helical Geared Shaft System subjected to Random Support Excitations", Seventh World Congress on the Theory of Machines and Mechanisms, Sevilla, September 17-22, 1987.
53. Bhat, R.B., "Vibration of Triangular Plates Using Orthogonal Polynomial Functions in Two Variables", Symposium on Recent Trends in Aeroelasticity, Structures and Structural Dynamics, Gainesville, Feb. 6-7, 1986.
54. Prabhu, B.S., Bhat, R.B. and Sankar, T.S., "Analytical Methods for Rotors Supported on Hydrodynamic Journal Bearings", Presented at the 41st Annual

Meeting of American Society of Lubrication Engineers, Toronto, Canada, May 12-15, 1986.

55. Charron, F., Donato, L., Jha, V.K., Bhat, R.B., "A New Method for Calculating Acoustic Response for Spacecraft Structures Using MSE Nastran", 3rd Structures and Materials Symposium, Canadian Aeronautics and Space Institute, 1986.
56. Neriya, S.V., Bhat, R.B., and Sankar, T.S., "Vibration of a Helical Geared Shaft System", presented at the Ninth Machinery Dynamics Seminar, Montreal, Canada, Oct. 1986.
57. Subbiah, R., Bhat, R.B. and Sankar, T.S., "Determination of Dynamic Behaviour of a Rotor Supported on Hydrodynamic Bearings Through Experimental Modal Analysis", 4th International Modal Analysis Conference, Los Angeles, CA., February 3-6, 1986.
58. Kaushal, A. and Bhat, R.B., "Vibration of Structures Through Modal Testing Coupled with Component Mode Synthesis", 4th International Modal Analysis Conference, Los Angeles, CA. February 3-6, 1986.
59. Subbiah, R., Bhat, R.B. and Sankar, T.S., "Rotational Stiffness and Damping Coefficients of Fluid Film in a Finite Cylindrical Bearing", Presented at the 40th Annual Meeting of American Society of Lubrication Engineers, Las Vegas, Nevada, May 6-9, 1985.
60. Jha, V.K., Sankar, T.S. and Bhat, R.B., "Optimization of Aerospace Structures Subjected to Random Vibration and Fatigue Constraints", 56th Shock and Vibration Symposium, Monterey, CA., October 22-24, 1985.
61. Subbiah, R., Bhat, R.B., Sankar, T.S. and Rao, J.S., "Backward Whirl in a Single Rotor Supported on Hydrodynamic Bearings", Symposium on Instability in Rotating Machinery, Carson City, Nevada, June 10-14, 1985.
62. Subbiah, R., Bhat, R.B. and Sankar, T.S., "Response of Rotors Subjected to Random Support Excitation", 10th Biennial ASME Conference on Vibration and Noise, Cincinnati, Ohio, September 10-13, 1985.
63. Neriya, S., Bhat, R.B. and Sankar, T.S., "Vibration of a Geared Train of Rotors with Torsional Flexural Coupling", 10th Biennial ASME Conference on Vibration and Noise, Cincinnati, Ohio, September 10-13, Paper No. 85-DET-124, 1985.

64. Kaushal, A. and Bhat, R.B., "Vibration of Plates Involving Free Edges Using Characteristic Orthogonal Polynomials", 19th Midwestern Mechanics Conference, Columbus, Ohio, September 9-11, 1985.
65. Subbiah, R., Bhat, R.B. and Sankar, T.S., "Dynamics of Rotors with Rotational Film Coefficients in Finite Cylindrical Bearings", 10th Canadian Congress of Applied Mechanics, London, Ontario, June 2-7, 1985
66. Bhat, R.B., "Vibration of Structures using Characteristic Orthogonal Polynomials in Rayleigh-Ritz Method", 10th Canadian Congress of Applied Mechanics, London, Ontario, June 2-7, 1985.
67. Kaushal, A. and Bhat, R.B., "Natural Frequencies and Mode Shapes of Rotating Structures Using Improved Strain Energy Formulation in Rayleigh-Ritz Method", 3rd International Modal Analysis Conference, Orlando, Florida, Jan. 28-31, 1985.
68. Bhat, R.B., "Vibration of Rectangular Plates Using Beam Characteristic Orthogonal Polynomials in Rayleigh-Ritz Method", 3rd International Modal Analysis Conference, Orlando, Florida, Jan. 28-31, 1985.
69. Bhat, R.B., "Modal Analysis of Mechanical Systems by Acoustical Measurements", Canadian Acoustical Association Symposium, Quebec City, Quebec, October 22-24, 1984.
70. Subbiah, R., Bhat, R.B. and Sankar, T.S., "Modal Parameter Identification in Rotors Supported on Hydrodynamic Bearings", Eighth Machinery Dynamics Seminar, Halifax, N.S., October 1-2, 1984.
71. Subbiah, R., Bhat, R.B. and Sankar, T.S., "Dynamic Response of a Simple Rotor Supported on Dissimilar Fluid Film Bearings", The International Forum for Theory of Machines and Mechanisms Conference, New Delhi, India, December 15-20, 1983.
72. Neriya, S.V., Bhat, R.B. and Sankar, T.S., "Effect of Coupled Torsional Flexural Vibration of a Geared Shaft System on the Dynamic Tooth Load", 54th Shock and Vibration Symposium, Pasadena, California, October 18-20, 1983.
73. Bhat, R.B., Subbiah, R. and Sankar, T.S., "Dynamic Behaviour of a Simple Rotor with Dissimilar Fluid Film Bearings by Modal Analysis", 83-DET-75, ASME Vibrations Conference, Dearborn, Michigan, Sept. 11-14, 1983.

74. Jha, V.K., Sankar, T.S. and Bhat, R.B., "Optimum Design of a Satellite Antenna Structure Under Random Excitation", Ninth Canadian Congress of Applied Mechanics, Saskatoon, Canada, May 30-June 3, 1983.
75. Subbiah, R., Bhat, R.B. and Sankar, T.S., "Dynamic Response of a Simple Rotor Supported on Dissimilar Fluid-Film Bearings", Ninth Canadian Congress of Applied Mechanics, Saskatoon, Canada, May 30-June 3, 1983.
76. Subbiah, R., Bhat, R.B. and Sankar, T.S., "Unbalance Response of a Single Mass Rotor Mounted on Dissimilar Hydrodynamic Bearings", 53rd Shock and Vibration Symposium, Danvers, MA., October 26-28, 1982.
77. Jha, V.K., Sankar, T.S. and Bhat, R.B., "Computer Aided Synthesis of a Satellite Antenna Structure with Probabilistic Constraints", 53rd Shock and Vibration Symposium, Danvers, MA., October 26-28, 1982.
78. Jha, V.K., Sankar, T.S. and Bhat, R.B., "Dynamic Response of a Satellite Antenna Structure to Random Excitation", 53rd Shock and Vibration Symposium, Danvers, MA., October 26-28, 1982.
79. Bhat, R.B. and Sankar, T.S., "Experimental Investigation of the Unbalance Response of a Rotor on Hydrodynamic Bearings", Proceedings of the Seventh Machinery Dynamics Seminar, Edmonton, October 4-6, 1982.
80. Bhat, R.B., "Unbalance Response of a Single Mass Rotor on Fluid Film Bearing using Modal Analysis", Proceedings of the 1st Int. Modal Analysis Conference, Orlando, Florida, November 8-10, 1982.
81. Bhat, R.B., Sharan, A.M. and Sankar, T.S., "Effect of Spatially Moving Random Tool Loads on the Response of Workpiece in Turning", Eighth Canadian Congress of Applied Mechanics, June 7-12, 1981, Moncton, N.B.
82. Rao, J.S., Bhat, R.B. and Sankar, T.S., "Unbalance Response of a Rotor in Hydrodynamic Bearings with Damping", Eighth Canadian Congress on Applied Mechanics, June 7-12, 1981, Moncton, N.B., Canada.
83. Sobieszczanski-Sobieski, J. and Bhat, R.B., "Adaptable Structural Synthesis Using Advanced Analysis and Optimization Coupled by a Computer Operating System", AIAA Paper No. 70-0723, AIAA/ASME/ASCE/AHS 20th Structures, Structural Dynamics and Materials Conference, St. Louis, Mo., April 4-6, 1981.

84. Bhat, R.B. and Xistris, G.D., "Prediction of Interior Noise in Aircraft Fuselages due to Propeller Noise Excitation", Canadian Acoustical Association Annual Symposium, Montreal, October 22-23, 1980.
85. Sankar, T.S., Jha, V.K. and Bhat, R.B., "Analytical Model for Input Spectral Densities for Response Estimation", Canadian Acoustical Association Annual Symposium, Montreal, October 22-23, 1980.
86. Bhat, R.B., Sobieszczanski, J. and Mixson, J.S., "Reduction of Aircraft Cabin Noise by Fuselage Structural Optimization", Proceedings of the National Noise and Vibration Control Conference and Exhibition, Chicago, March 14-17, 1977.
87. Bhat, R.B., Banerjee and Ramadasa, P., "Stress Waves in an Elastic Rocket Subjected to Thrust Loading", Proceedings of the Symposium on Stress Waves in Solids, New Delhi, India, 1973.
88. Rao, B.V.A. and Bhat, R.B., "Studies on a Disc Type Electric Horn", Proceedings of the Seminar on Sound and Vibration Problems in Engineering, New Delhi, India, 1972.
89. Rao B.V.A., Bhat R.B. and Ganesan, N., "Studies on a Vibration Damper", Proceedings of the 16th Congress on Theoretical and Applied Mechanics, Allahabad, India, 1972.
90. Rao, B.V.A. and Bhat, Rama B., "Design, Development and Calibration of an Experimental Setup for Acoustic Studies", Proceedings of the 16th Congress on Theoretical and Applied Mechanics, Allahabad, India, 1972.
91. Rao, B.V.A. and Bhat, R.B., "Determination of Natural Frequencies and Modal Patterns of Vibrating Structures by Acoustic Measurements", Proceedings of the 15th Congress on Theoretical and Applied Mechanics, Sindri, India, 1970.

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## Technical reports

1. Bhat, R.B. and Mixson, J.S., "A Theoretical Investigation of Noise Reduction Through the Cylindrical Fuselage of a Twin Engine Propeller Driven Aircraft", NASA TP 1325, 1978, NASA Langley Research Center, Hampton, Virginia.
2. Bhat, R.B., "Role of Acoustic Testing in Space Research", SSTC TN STR 006, Vikram Sarabhai Space Centre, Trivandrum, India, 1973.

3. Kulkarni, A.M., Bhat, R.B. and Joseph, K.T., "Dynamic Envelope for the Heat Shield and Fourth Stage Satellite Interstage Combination for SLV-3 Vehicle", Structural Engineering Division, Vikram Sarabhai Space Centre, India, 1973.

### **Books published**

1. Bhat, R.B., Gouw, G., "Numerical Methods in Engineering, GINN Press, Needham Heights", MA, 1990.
2. Dukkipati R.V., Ananda Rao M. and Bhat R.B., "Computer Aided Analysis and Design of Machine Elements", Wiley Eastern Limited, New Delhi, 1997.
3. Bhat R.B. and Dukkipati R.V., "Advanced Dynamics", Narosa Publishing House, New Delhi, In Print, Letter dated July 13, 1999.

### **Contribution to books**

1. A chapter on Vibration Control in the Standard Handbook of Machine Design with Dr. Joseph Shigley as Editor, McGraw-Hill Book Company, New York, 1986. (Co-author)
2. A chapter to "Instability in Rotating Machinery", published by NASA Lewis Research Center, Cleveland, Ohio, 1985. (Co-author)

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## **MISCELLANEOUS INFORMATION**

### **Grants and contracts**

- Total amount of grants received: \$2,657,240.76

### **Professional society memberships**

- Fellow, Institution of Engineers (India)
- Fellow, American Society of Mechanical Engineers
- Fellow, Acoustical Society of India
- Member, Canadian Society of Mechanical Engineering
- Member, American Academy of Mechanics

### **External professional activities**

- Member of Conference Technical Committee, 12th ASME Biennial Conference on Mechanical Vibration and Noise, Montreal, 1989.
- Reviewed Technical papers for Trans. ASME, Trans. CSME, IMACS Journal, CANCAM Conference, Journal of Sound and Vibration.
- Served as Session Organizer and Session Chairman in several International Conferences.
- Delivered invited lectures in universities in U.S.A., Argentina and India

### **Other university duties**

- Undergraduate Program Coordinator, Dept. of Mechanical Engineering, 1991-92.
- Graduate Program Director, 1988-1990, 1992-1994.
- Member of Department Personnel Committee, 1996-1998
- Member, Faculty Space Committee, 1995-1998
- Grievance Officer, Concordia University Faculty Association, 1997-1998
- Associate Dean, Graduate Programmes & Research, 1998-
- Member of Joint Grievance Committee, 1999-

Course on

## **Mechanical Vibrations**

**Instructor:** Rama Bhat, Professor of Mechanical Engineering, Concordia University, Montreal, Canada

**OBJECTIVES:**

Vibrations induces stresses in machines and structures. A clear understanding of the theory of vibrations of mechanical systems is a basic requirement for the analysis, design and maintenance of machines and structures. This course will gradually expose the vibration fundamentals in a logical sequence and will clarify them further through carefully chosen examples. The laboratory sessions are intended to enhance this understanding and to familiarize with the vibration instrumentation. The solutions of practical problems, understanding of critical effects of vibration and isolation of vibration will be emphasized through examples, laboratory work and home-works.

**COURSE OUTLINE**

Introduction to vibration

Free vibration of single-DOF systems

Forced vibration of single-DOF systems – Harmonic Excitations

Vibration measurements

Vibration control

Forced vibration of single-DOF systems under general forcing conditions

Vibration of two-DOF systems

Vibration absorber

Vibration of multi-DOF systems

Natural frequencies and mode shapes of multi-DOF systems

**Text:**

Rao, J.S. and Gupta, K. Introductory Course on Theory and Practice of Mechanical Vibrations, 2<sup>nd</sup> Edition, John Wiley & Sons, 1999.

OR

Rao, Singiresu S, Mechanical Vibrations, 6th Edition, Pearson, 2017

DINT / 10-17/011

# Veltech Dr.RR & Dr.SR University

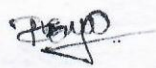
(Estd. u/s 3 of UGC Act, 1956)

## Office of International Programmes

### Visiting Professor Programmes

#### Details of Professor & Course:

|                       |                                           |
|-----------------------|-------------------------------------------|
| Name of the Professor | Prof.Dr. Rama Bhat (Profile Attached) ✓   |
| University & Country  | Concordia University, Canada              |
| Title of the Course   | Fundamentals of Vibration 6               |
| Department            | Mechanical Engineering                    |
| Dates of the Course   | February 5-16, 2018 (postponed from 2017) |
| Total No. of Hours    | 20                                        |
| No. of Credits        | 1                                         |
| Course Contents       | List Attached                             |

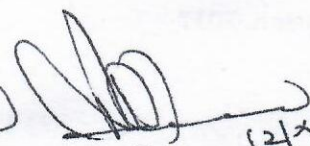
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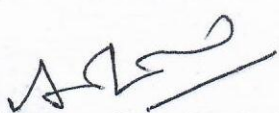
Coordinator – Office of Intl. Pgms

Forwarded by:  11/10/17

Director – Office of Intl. Pgms

 HoD

 Dean 12/17

 Director (Academic)

Vice Chancellor

Dean School of Mechanical & Construction  
Veltech Dr.RR & Dr.SR University  
(Estd. u/s 3 of UGC Act, 1956)

| SNo | Stu_Id  | Stu_Name                                    | Stu_Branch | Stu_Batch | Stu_Test_Subj<br>ectCode | Stu_Test_SubjectName  | Stu_Subje<br>ct_PassFai | Stu_Exa<br>minatio | Stu_Grad<br>e |
|-----|---------|---------------------------------------------|------------|-----------|--------------------------|-----------------------|-------------------------|--------------------|---------------|
| 1   | VTU6007 | KADAVALA TEJA VENKATA<br>SATYA SAI          | MECHANICAL | 2015-2016 | 1157ME918                | Mechanical Vibrations | Pass                    | 6                  | C             |
| 2   | VTU6024 | KANDREGULA JOGESWARA<br>VINAY KUMAR         | MECHANICAL | 2015-2016 | 1157ME918                | Mechanical Vibrations | Pass                    | 6                  | B             |
| 3   | VTU6340 | AJMALFAROOK.H                               | MECHANICAL | 2015-2016 | 1157ME918                | Mechanical Vibrations | Pass                    | 6                  | A             |
| 4   | VTU6415 | KASIREDDY ROYAL PRATHAP<br>REDDY            | MECHANICAL | 2015-2016 | 1157ME918                | Mechanical Vibrations | RA                      | 6                  | AB            |
| 5   | VtU6448 | NALLAPPAREDDYGARI<br>CHAITHANYA KUMAR REDDY | MECHANICAL | 2015-2016 | 1157ME918                | Mechanical Vibrations | Pass                    | 6                  | B             |
| 6   | VTU6449 | KARASU SESA SAI CHARAN TEJ                  | MECHANICAL | 2015-2016 | 1157ME918                | Mechanical Vibrations | Pass                    | 6                  | B             |
| 7   | VtU6595 | TIRUNAMALA PHANI MOHAN                      | MECHANICAL | 2015-2016 | 1157ME918                | Mechanical Vibrations | Pass                    | 6                  | S             |
| 8   | VTU6060 | SRI HARSHA CHAKRAVARTHY<br>CHAPPATA         | MECHANICAL | 2015-2016 | 1157ME918                | Mechanical Vibrations | RA                      | 6                  | AB            |
| 9   | VTU6064 | VANGAPANDU GOUTHAM                          | MECHANICAL | 2015-2016 | 1157ME918                | Mechanical Vibrations | Pass                    | 6                  | C             |
| 10  | VTU6117 | VENATI SAI CHARAN                           | MECHANICAL | 2015-2016 | 1157ME918                | Mechanical Vibrations | Pass                    | 6                  | D             |
| 11  | VTU6168 | ESTHAK MATHIAZHAGAN S                       | MECHANICAL | 2015-2016 | 1157ME918                | Mechanical Vibrations | RA                      | 6                  | AB            |
| 12  | VTU6231 | NAVIN KUMAR                                 | MECHANICAL | 2015-2016 | 1157ME918                | Mechanical Vibrations | Pass                    | 6                  | C             |
| 13  | VTU6254 | VIGNESH. K                                  | MECHANICAL | 2015-2016 | 1157ME918                | Mechanical Vibrations | Pass                    | 6                  | D             |

|    |         |                    |            |           |           |                       |      |   |   |
|----|---------|--------------------|------------|-----------|-----------|-----------------------|------|---|---|
| 14 | VTU6257 | ADITYA MAKESH      | MECHANICAL | 2015-2016 | 1157ME918 | Mechanical Vibrations | Pass | 6 | C |
| 15 | VTU5927 | GANGADHAR SHARMA N | MECHANICAL | 2015-2016 | 1157ME918 | Mechanical Vibrations | Pass | 6 | A |
| 16 | VTU8126 | R.KARTHIKEYAN      | MECHANICAL | 2015-2016 | 1157ME918 | Mechanical Vibrations | Pass | 6 | C |
| 17 | VTU8130 | R.NAGENDRA PRASAD  | MECHANICAL | 2015-2016 | 1157ME918 | Mechanical Vibrations | Pass | 6 | C |
| 18 | VTU8134 | PRATHEESH.P        | MECHANICAL | 2015-2016 | 1157ME918 | Mechanical Vibrations | Pass | 6 | D |
| 19 | VTU8347 | RAJESH R           | MECHANICAL | 2015-2016 | 1157ME918 | Mechanical Vibrations | Pass | 6 | D |

DINT/02-18/08



**Vel Tech**  
Rangarajan Dr. Sagunthala  
R&D Institute of Science and Technology  
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

Our Ref. No: 2017/VF 77

Your Ref. No:

**Submitted for the Approval:****Name of the Professor:** Prof. Dr. Rama Bhat**University & Country :** Concordia University, Canada**Course Titles :** Fundamentals of Vibrations**Department :** Mechanical Engineering**Students :** 2015-2019, 18 Students**Training Program date:** 6<sup>th</sup> February to 16<sup>th</sup> February, 2018

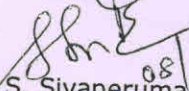
| Sl.No | Description                                                                   | Amount in INR |
|-------|-------------------------------------------------------------------------------|---------------|
| 1     | Course Honorarium ( Rs.3000 * 30 Hrs = INR 90,000)<br>(Net Amount & Tax Free) | 17500         |
|       | To Pay= 90000- 72500(Flight Ticket cost)= 17500 INR                           |               |
|       | <b>Total</b>                                                                  | <b>17500</b>  |

**(Rupees Seventeen thousand five hundred only)**

In this regard, I request your approval for transferring the amount to the following Account,

**Name :** Rama Bhat**Bank name:** Syndicate Bank**Branch :** KASARAGOD, Kerala**Account No:** 42042010050919**IFSC Code :** SYNB0004024

Thank You,

  
 08/02/2018  
 S. Sivaperumal

Dr. S. Sivaperumal  
Director International Relations

**Vel Tech**  
Rangarajan Dr. Sagunthala  
R&D Institute of Science and Technology  
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

Form 12-1

**Vel Tech Delegates Visited :**

1. Mr. K.V.D. Kishore Kumar (Vice President)
2. Dr. S. Sivaperumal (Director – International Relations)

**University & Country** : Concordia University, Canada.

**Date Visited** : 14.05.2018 to 25.05.2018

**Purpose:** Mr. K.V.D. Kishore Kumar, Vice President and Dr. S. Sivaperumal, Director for International Relations visited Universities in Canada and USA towards exploring the possible academic and research cooperation. As a part of the visit, the delegation visited Concordia University, Mc-Gill University, Carleton University, Ryerson University, McMaster University, York University, University of Windsor, University of Michigan-Dearborn, University of Detroit-Mercy and Stevens Institute of Technology during May 14 to May 25, 2018. MoU renewed with University of Michigan-Dearborn, USA.

**Delegates Visited** : Prof. Dr. Muthukumaran Packirisamy  
**Designation** : Professor & Concordia Research Chair, Optical-Bio Microsystems Laboratory & ConSiM  
**University & Country** : Concordia University, Canada  
**Date Visited** : 05.01.2019

**Purpose:** Prof. Dr. Muthukumaran Packirisamy, Professor & Concordia Research Chair, Optical-Bio Microsystems Laboratory & ConSiM (Concordia Silicon Microfabrication facility) of Concordia University, Canada visited Vel Tech on 5th Jan., 2019 for collaborations and research discussions. He addressed the research faculty members about the possible research cooperation in the area of MEMS. He shared the details of projects for students.

