

Instructor Résumé

COLIN P. RATCLIFFE, PhD

Consultant and Professor in
Structural and Modal Analysis and Testing to
Technology Training, Inc.

Dr. Ratcliffe has over 25 years experience in the field of mechanical structural analysis. This includes experimental and theoretical work in such topic areas as the characterization of vibroacoustic materials, vibration methods for damage detection, and finite element modeling of linear and non-linear systems. He is internationally known for his work in modal analysis, damage detection, and the characterization of composite materials. He has two patents and nearly 100 published papers and reports in national and international journals. He also conducts short courses in the experimental aspects of modal analysis, as requested by academia and industry.

EXPERIENCE

- 1991–Present UNITED STATES NAVAL ACADEMY, Annapolis, MD. *Professor*, Mechanical Engineering Department. In addition to routine teaching assignments, Dr. Ratcliffe is Course Director for three courses: Dynamics; Mechanical Engineering Experimentation; and Introduction to Mechanical Vibrations.
- 1990–Present *Consultant* to several companies, recently including National Composite Center, Production Products and Manufacturing, Duke Engineering, Ingalls Shipbuilding, Total Training Technology, DTI, and Devonport Management Limited, as well as several codes at the NSWC Carderock and Annapolis divisions. His work has included designing a new marine engine anti-vibration mount system for the United States Navy, developing damage detection procedures for composite structures, investigating the impact of paint coatings on vibration mounts, experimental and analytical vibration analysis of a wide variety of structures from a few inches in size up to about 50 feet, teaching Professional Engineer's review courses, and supervising shock testing of marine components.
- 1991–1992 ROYAL NAVAL ENGINEERING COLLEGE, Manadon, Plymouth, United Kingdom. Lieutenant Commander (Royal Navy - Instructor Officer), responsibilities included teaching a year-long sophomore class (Mechanical Engineering Systems, MES) that included a combination of classical statics, strength of materials and dynamics; and developing a new laboratory sequence for that course. Dr. Ratcliffe also taught guest lectures to the Master's engineering course and was Course Director for MES and Laboratory Supervisor. Research projects included modeling the dynamic behavior of electro-rheological fluids, active control of transmitted force in a submarine water compensator, design and testing of a tunable vibration absorber for maritime diesel generators, modal testing of blast panels for North Sea oilrigs, and structural vibration measurements on a German 1940's river boat.
- 1988–1991 UNITED STATES NAVAL ACADEMY, Annapolis, MD. Lieutenant Commander, Royal Navy, on exchange. Duties and responsibilities included teaching mechanical engineering undergraduate courses, Vibrations Laboratory Manager, and many 'diplomatic style' activities. Research projects included a variety of experimental vibration tests of military components, as well as the characterization of materials for underwater anechoic tiles.
- 1985–1988 HMS HECATE, Scientific Officer. HMS HECATE was a deep-ocean survey ship in the Royal Navy whose main survey areas at that time were in the Greenland/Faeroes gap and in the South Atlantic. Dr. Ratcliffe supervised a group of technicians who ensured the multitude of deep-ocean navigation and survey systems were producing quality data. The main systems were inertial navigation, LORAN, transit satellites, gravimeters, magnetometers, expendable bathythermographs, and sonar systems.
- 1980–1985 ROYAL NAVAL ENGINEERING COLLEGE (RNEC), Manadon, Plymouth, United Kingdom. Mr. Ratcliffe taught engineering courses at both the undergraduate and graduate levels. During this period he undertook research and part-time studies, culminating in the award of his PhD in 1985 from Southampton University, England.
- 1978–1980 Royal Naval Apprentice School HMS FISGARD, Cornwall, United Kingdom. Lieutenant Instructor Officer, Royal Navy. Full-time teaching job.
- 1977–1978 Royal Navy Junior Officer, HMS SALISBURY and HMS THUNDERER.



EDUCATION

PhD, UNIVERSITY OF SOUTHAMPTON, England, The Institute of Sound and Vibration Research, 1985. Dissertation: Dynamic Structural Modeling for Time Domain Analysis.

Master of Arts, Mechanical Engineering, CAMBRIDGE UNIVERSITY (Sidney Sussex College), England, 1981.

Bachelor of Arts, Engineering. CAMBRIDGE UNIVERSITY (Sidney Sussex College), England, 1977. First Class Honors.

PROFESSIONAL AND TECHNICAL

CEng (1986) Chartered Engineer (London).

MIMarEST (1985) Member of the Institute of Marine Engineering, Science and Technology, London.

TEACHING ACTIVITIES

Graduate (MS) Courses Taught: Mechanical Design for Vibration Synthesis; Vibration Measurement Systems.

Undergraduate Degree Courses Taught: Dynamics; Mechanical Engineering Experimentation; Mechanical Engineering Systems; Mechanics of Sea and Air Vehicles; Statics; Strength of Materials; Structural Dynamics; Structural Mechanics; Introduction to Vibrations; Thermodynamics

Other Courses Taught:

Trade School: Engineering Drawing; Mechanical Engineering

High School equivalent: English Literacy; Mathematics; Physics

Continuing Education: Modal Analysis (Acoustical Society of America, Industry, and TTI); Fundamentals of Engineering (FE) / Engineer in Technology (EIT) review (Statics, Dynamics, Mathematics, Strength of Materials); Professional Engineer review (PE) (Vibration, Mechanical Design)

SELECTED RECENT PUBLICATIONS (2001-2002) (a more complete list is available on request)

REFEREED JOURNAL ARTICLES AND CONFERENCE PROCEEDINGS

"Balanced Fuel Injector Effects on In-Flight Aircraft Engine Vibration," David F. Rogers and Colin P. Ratcliffe, AIAA Journal of Aircraft, V39, N3, 2002.

SYMPOSIA, PROCEEDINGS AND PRESENTATIONS

M. K. Yoon, Dirk Heider, John W. Gillespie, Jr., Colin P. Ratcliffe, Roger M. Crane, "Damage localization in composite structures using a global fitting method on FRF shapes," American Society for Composites, 16th Annual Technical Conference, Virginia Tech, Blacksburg, VA September 9-12, 2001.

"Damage Localization Using the Two-Dimensional Gapped Smoothing Method," M. K. Yoon, Dirk Heider, John W. Gillespie, Jr., Colin P. Ratcliffe, Roger M. Crane, 46th International SAMPE Symposium/Exhibition, Long Beach Convention Center, Long Beach, CA, May 6-10, 2001, pp. 752-764.

"Local Damage Detection Using A Global Fitting Method On Mode Shape Data," M. K. Yoon, D. Heider, J. W. Gillespie Jr., C. P. Ratcliffe, R. M. Crane, *The Society for Experimental Mechanics, International Modal Analysis Conference IMAC-19*, V, pp 231-237. Orlando, 2001.

TECHNICAL REPORTS

"A Report on the SIDER Testing of the Half-Scale Composite Corvette Hull Section," Colin P. Ratcliffe, Roger M. Crane, NSWCCD-65-TR-2002/?, June 2002 (in press).

"Long-Term Health Monitoring of the Composite Road Bridge on Delaware Route 896," Colin P. Ratcliffe, Roger M. Crane, NSWCCD-65-TR-2001/21, October 2001.

"Structural Integrity and Damage Evaluation Routine (SIDER) for Quality Control and Health Monitoring of Structures such as Bridge Decks," Colin P. Ratcliffe, Roger M. Crane, Dirk Heider, Myung Keun Yoon, and John W. Gillespie Jr., NSWCCD-65-TR-2001/23, October 2001.

