

ROTATING MACHINERY & CONTROLS LABORATORY

ROMAC NEWSLETTER

Message from the Director

Houston Wood
Professor, Mechanical & Aerospace Engineering
Director of ROMAC
Director of Applied Mathematics

The spring edition of the ROMAC newsletter features a couple of especially exciting developments.

ROMAC Structure

To improve and streamline our research activity and to enable better interaction with industrial members, ROMAC has adopted a new structure: a Management team (consisting of the Director and Two Associate Directors), Faculty Members, the MAE Department Chair as an external adviser, Staff, and Graduate Students. I am pleased to announce that Dr. Alex Untaroiu and Dr. Roger Fittro have been appointed by the Dean as ROMAC Associate Directors.

Dr. Edgar J. Gunter, Professor Emeritus at the University of Virginia, an industry-recognized rotordynamics and fluid-film bearing expert, is now working with ROMAC faculty, staff,

and students in the capacity of External Adviser. Dr. Gunter will be assisting with the advising of some of the graduate student research work in the areas of rotordynamics and fluid-film bearings. His experience and expertise in the field is a very welcomed addition to the ROMAC community.

In addition, we are working to increase the input and involvement of our ROMAC industrial members. With this in mind, we are planning to modify the organization of the annual meeting to include the presentation of research proposals followed by discussion sessions (see **ROMAC Annual Meeting** below for more details). We value the input we receive from the industrial membership and welcome further ideas on how we might increase and enhance this input even more in the future.

New ROMAC Members

We are very pleased to share with you that the ROMAC industrial membership has continued to grow over the past few months. Since January 2014, the ROMAC Consortium has added the following companies (listed in alphabetical order):

- Brazilian Navy
- BRG Machinery Consulting, LLC
- Grant County PUD
- Rodyn Vibration Analysis, Inc.
- Shanghai Electric Group

As many of you are aware, BRG Machinery Consulting is no stranger to ROMAC. They were a ROMAC Member Company and many of the individual team members of BRG have had personal connections to ROMAC over the years – as ROMAC faculty, staff, or graduate students. ROMAC faculty approached BRG during the latter half of 2013, to begin discussions about BRG's potential future involvement and membership in ROMAC. As a result of those discussions, BRG returned as a ROMAC Member Company. In addition, they will be acting to assist ROMAC by supplying key technical expertise in the areas of fluid-film bearings, seals,



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and rotordynamics. We feel that they have excellent skills to offer and that their addition will work to the benefit of the entire ROMAC membership. We look forward to having them work closely with all of us as we endeavor to grow and strengthen ROMAC now and into the future.

New Graduate Students

In the past few months we have been actively involved in identifying and attracting new graduate students for ROMAC. The screening and interviewing process has resulted in six offers being extended. Some of these incoming graduate students already have experience working in industry. Three of them will start their activity in May, and you will meet them at the annual meeting, while the rest of them will join us in August, when the Fall semester begins.



Visiting Scholars

We currently have two visiting scholars doing research in ROMAC. Dr. Ya Zhang, a Visiting Professor from the Beijing University of Chemical Technology, has research interests focused on vibration and control of mechanical systems as well as fault mechanisms of rotating machinery. Dr. Zhang will be working in ROMAC until August, 2014. Ronaldo de Held Falashi of the Brazilian Navy will be working with us on magnetic bearing design and controls over the next four months. In addition, four new visiting scholars are planning to join us in the upcoming year.

New Software Releases

THRUST: ROMAC has been working with Ted Brockett over the past year to upgrade the existing THRUST code. Version 5.10 of THRUST has just been released and can be downloaded from the ROMAC website. Upgrades and enhancements to THRUST include:

- Conversion from FORTRAN-77 to Fortran-90/95 with dynamic memory allocation. All arrays and matrices are dynamically allocated.
- Solved the nuisance faults and convergence issues by coupling the film energy solution with the pad conduction solution and making mating meshes use the same nodes.
- Both 64-bit and 32-bit compiled versions are available.
- Shared-memory-parallel enabled code offers a faster solve rate for multi-core CPUs. OpenMP version 3.0

standard is used, and implemented LAPACK routines are now parallelized.

RotorLab+ v3.0 was released in January, 2014. This version, which can be downloaded from the ROMAC website, includes:

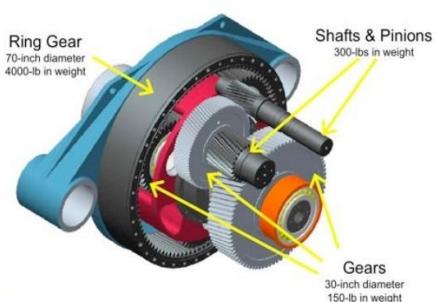
- ROTSTB, FORSTAB rev. 1
- THBRG, THPAD
- LABY3, SEAL3
- API spec check rev. 1

Development work on RotorLab+ continues, with the next version (v4.0) expected during the summer. Planned upgrades for **RotorLab+ v4.0** include:

- FORSTAB rev2
- API spec check rev. 2
- MAXBRG
- SQFDAMP
- A new seal bulk flow code
- ROTORSOL rev. 1

GearRotor has been officially released for ROMAC member use. It is a finite element based code for geared rotor dynamic systems, which couples the axial, lateral, and torsional degrees-of-freedom of geared shafts. It can be applied to a wide variety of both spur and helical geared systems and is sufficiently robust to account for arbitrary orientation angles between the parallel shafts. It is used to evaluate the damped natural frequencies, mode shapes, and the response due to unbalance of geared systems. Although it is currently written as a stand-alone executable, its features will be merged within RotorSol for future versions and RotorLab+ will be its future interface. Current features include:

- Running from a downloadable Matlab Compiler Runtime (MCR) to avoid user purchase of a Matlab license.
- The ability to handle multiple gear meshes and unlimited shafts.
- The average gear mesh stiffness may be a direct user input or may be computed from several input parameters.
- Axial, lateral, torsional, and coupled analysis options are available.



ROMAC Annual Meeting



The 2014 ROMAC Annual meeting will be held in Charlottesville, from June 23 to 27 at the Holiday Inn, 1901 Emmet St. Based on your comments and suggestions, we are proposing a new meeting format this year. We will again start with a

reception on Monday night, followed by all-day technical sessions Tuesday through Thursday. On Friday, we will have the Questionnaire Summary and Discussions followed by lab tours and individual software help sessions. There will be five technical sessions (Rotordynamics, Bearings, Seals and Optimization, Test Rigs, and Magnetic Bearings). Each session will include a number of technical presentations reporting on the research activities conducted over the past year. In addition, each technology section will include Research Proposals related to future research work as well as time for general discussions related to the specific technology area. The goal of this new format is to increase interaction between the industrial members and ROMAC researchers. Based on the enhanced input received from the industrial partners in this process, the research priorities, goals and projects will be formulated for the upcoming year.

As usual, we look forward to hearing talks from member companies. If you wish to make a presentation, please contact us at romac@virginia.edu.

If you are coming to Annual Meeting you will need to register. The registration form is on our website. The registration fee is waived for two people from each ROMAC member company. If your company wants to send more attendees, they are welcome to join us for a registration fee of \$250.

We look forward to meeting with you at the ROMAC Annual Meeting in June.



One-Day Workshops in June

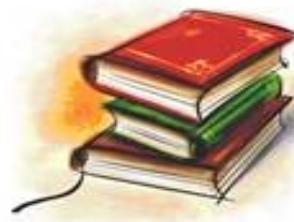
In connection with the Annual Meeting, two concurrent workshops have been planned for Monday, June 23. One will cover Rotordynamics and the other will be on Magnetic Bearings. The workshops will be held at the Mechanical Engineering Building in Charlottesville, VA. A nominal fee of \$300 per attendee will be charged. For more information and registration for the one-day workshops please contact us at romac@virginia.edu.

ROMAC Short Course in July

The 2014 Rotordynamics/Magnetic Bearings Short Course will be a 5-day course held July 28-August 1, 2014, at the Mechanical Engineering Building in Charlottesville, VA. This course will include topics in rotordynamics, bearings and applied dynamics as well as magnetic bearings. A registration fee of \$1,250 per attendee for employees of ROMAC member companies will be charged. The fee for non ROMAC members is \$2,500 for the full course. More information on the course, a brochure, and registration information will be available on the ROMAC website shortly.

ROMAC Short Courses-on-Request

As a reminder, we would like to mention that ROMAC is also available to offer Short Courses-on-request throughout the year. Course topics can include introductory-to-advanced Rotordynamics and/or Magnetic Bearings.

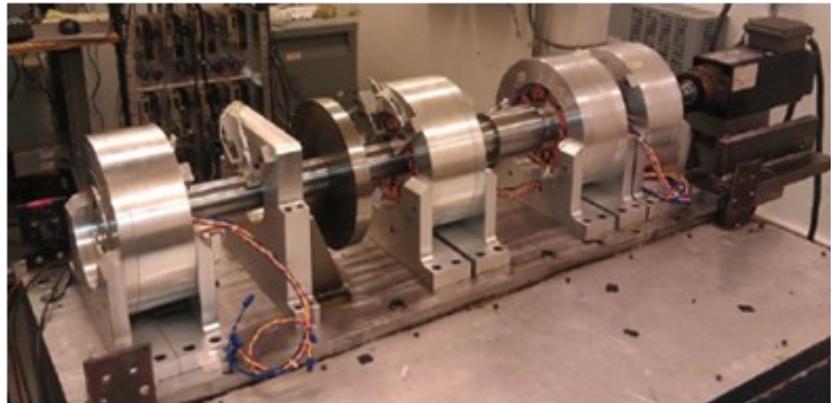


These courses can take place at the ROMAC labs at the University of Virginia, member locations, or other locations more convenient to attendees. Please contact us at romac@virginia.edu for more information.



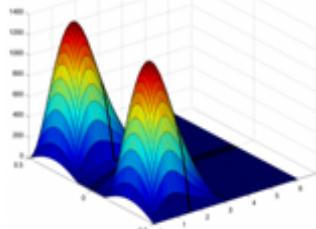
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www.virginia.edu/ROMAC



Areas of Expertise and Current Research

- Software Development and Test Rig Validation
- Finite Element Analysis (FEA)
- Computational Fluid Dynamics (CFD)
- Fluid Film and Rolling Elements Bearings
- Seals
- Squeeze Film Dampers
- Foil Bearings
- Rotordynamics
- Magnetic Bearings and Controls
- Optimization of Rotor-Bearing Systems
- Experimental, Computational, and Theoretical Studies



University of Virginia ROMAC Laboratory

Department of Mechanical and Aerospace Engineering
P.O. Box 407602
Charlottesville, VA 22904

(434) 924-3292