CMRR Report

Center for Magnetic Recording Research

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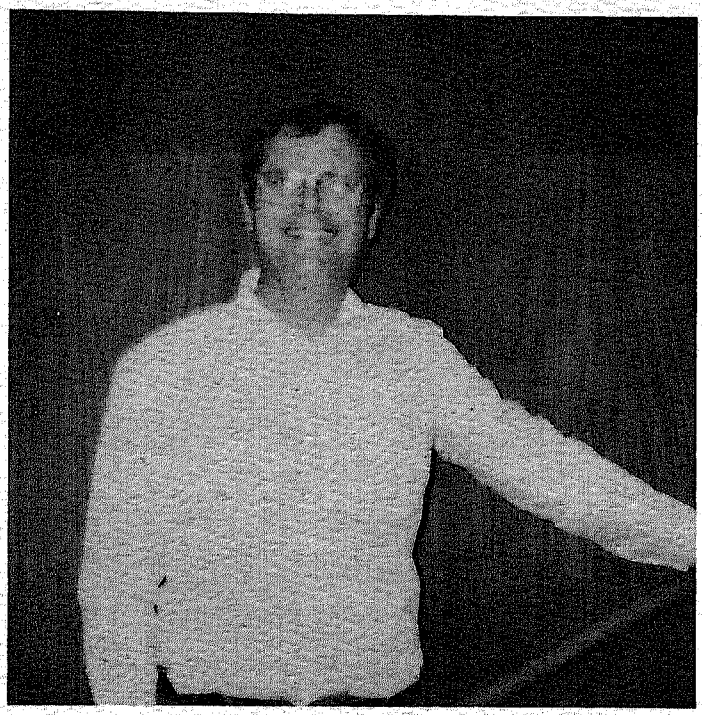
Spring 1986



Dr. Frank E. Talke

Third Endowed Chair Appointment

Frank E. Talke has been appointed as the third endowed professor to the Center for Magnetic Recording Research and will take up his position in March 1986. He has been named as a professor in the UCSD Department of Applied Mechanics and Electrical Engineering.

John Mallinson, CMRR's director, says of Talke, "He's a world class authority on the application of mechanical engineering to magnetic tape and disc drives."

Talke has worked for IBM's San Jose research establishment since 1969. There, he has specialized in mechanical and materials aspects of magnetic recording and printing technologies; balancing both theoretical and experimental approaches.

Pursuant to his interest in the educational aspects of engineering, Talke has been a guest lecturer at the University of Santa Clara for the past fifteen years. In 1984 he took a sabbatical from IBM to join UC Berkeley as visiting professor in the Department of Mechanical Engineering. While there he worked with Professor David Bogy on projects funded by CMRR in head-disc dynamics and head-disc tribology.

A native of Germany, Talke completed his undergraduate degree at the University of Stuttgart. In 1968 he received a Ph.D. in mechanical engineering from Berkeley. Since then he has published over forty papers, has eleven patents assigned to him and has received a number of honors and awards. CMRR looks forward to having Frank Talke join the faculty, the third of the four endowed chairs.

CMRR Moves into New Building

New Year's Eve, 1985 found the faculty and staff of CMRR helping the movers settle us in our new facility on the UCSD campus. It was an interesting way to start a new year. For the first month of our occupancy the contractors and their employees outnumbered us. There was no landscaping, and the floors thus suffered a great deal of abuse. Every person who entered brought a new pile of dirt. While many of us were able to set up our offices, the labs were not yet complete, and much of the equipment sat in boxes for a month or so. It took time, but we are now operational and taking great pride in our new location. Our gala opening was celebrated by the first IEEE Magnetics Society, San Diego Chapter meeting in the new lecture hall. Jim Lemke addressed a crowd of almost eighty guests on January 23. Our own Professor Neal Bertram is the new head of the San Diego chapter of the Magnetics Society.

Communicate by Telefacsimile

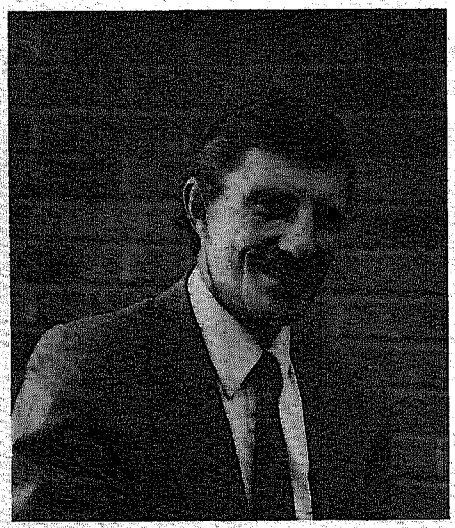
CMRR has recently installed a telefacsimile machine which can be used to transmit information, particularly documents which include drawings or diagrammatic material, twenty-four hours a day. The number is (619) 452-2720.

Focus on Bogy Research

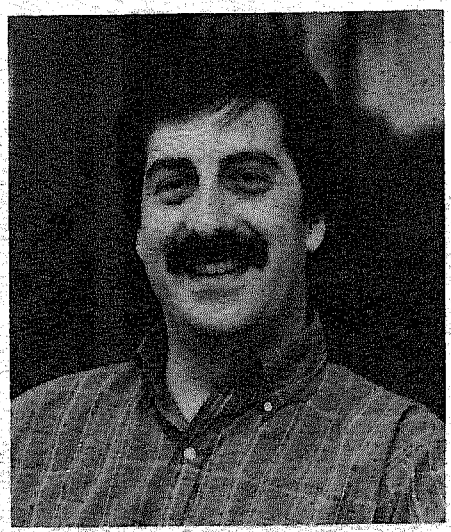
Dr. David Bogy of the Mechanical Engineering Department at U C Berkeley is the recipient of CMRR funds for a three year research project which began in July, 1983. His project is titled "Mechanical Analysis of the Head/Disk Interface in Magnetic Recording."

Dr. Bogy received an M.S. in Mechanical Engineering from Rice University, and his Ph.D. in Applied Mathematics from Brown University. He joined the faculty of U C Berkeley in 1967 as Assistant Professor of Applied Mechanics. He has been a consultant to IBM Research since 1972. Dr. Bogy is known for his work in elasticity and fluid mechanics and, most recently, has studied piezoelectric layers, disks, and cylinders. Professor Bogy authored the first paper resulting from CMRR funded research. The paper was read by Dr. Al Hoagland at the Intermag Conference in Hamburg in April 1984. The object of Professor Bogy's research program is to perform experimental and theoretical studies of the head/disk interface under unsteady conditions taking into account the dynamics of the sliders, the vibrations and roughness of the disk, and the appropriate limitations of the continuum assumption. The increasing areal densities trend in magnetic recording—accomplished by decreasing the read/write gap length, the head disk spacing, and the magnetic coating thickness, produces a continuing problem in disk files—the maintenance of very small spacings. Most studies to date have been restricted to steady state conditions and have assumed that rigid disks are smooth and flat.

Dr. Bogy's experimental work will investigate the dynamic variations in flying height of the read/write head because of the above factors, while his theoretical study will focus on the transient analysis of head/disk spacing.



Dr. Ian Croll



Dr. Craig Perlov

Dr. Robert J. Youngquist

Industrial Visitors in Residence at the Center

DR. IAN CROLL on sabbatical from IBM, joined CMRR in 1985 and will be in residence for twelve months. A senior technical staff member at IBM's San Jose Research Laboratory, Dr. Croll has held a number of technical and managerial assignments in the areas of chemical research and development of storage devices. He managed the research and development of thin film heads for magnetic recording and most recently was assigned to develop IBM's strategy for building closer and more productive ties with universities in the area of magnetic recording technology. Since coming to the Center, Dr. Croll has organized a workshop sponsored by CMRR on magnetic recording materials. He is presently initiating research projects on electrochemical process of iron group alloy electrodes.

DR. CRAIG PERLOV has also joined the Center as an industrial visitor, initially for a six-month period which began in November 1985. Dr. Perlov is a senior scientist with Control Data Corporation, Minneapolis, MN. On joining CDC, Dr. Perlov worked in the Perpendicular Recording Research Group. On his return to Minnesota, he will be part of the Recording Research Group, a department of the Research Division. While at the Center, he is involved in Ba ferrite related projects. Professor Stanley Middleman of UCSD's Department of Applied Mechanics and Engineering Sciences is working with Perlov, particularly on a project concerning the rheology of Ba ferrite slurries. A further project involves an analysis of the orientation process of Ba ferrite particles. Another area of investigation will involve modelling the magnetization process in a Ba ferrite-like system. Professor Neal Bertram will also be involved in this project. Dr. Perlov organized a workshop in which the speakers discussed their research related to cobalt chromium for perpendicular recording. All projects discussed were CDC-sponsored research.

MR. ROBERT YOUNGQUIST from 3M, St. Paul, MN is with the Center for the 1985/1986 academic year. He takes over from Richard Fayling, who had been the 3M industrial visitor for an extended period, dividing his time between St. Paul and San Diego. During his time at the Center, Dick organized the first workshop on "Wear, Friction and Lubrication." Because of its success, plans were made to hold this workshop, which takes the form of a small interactive group of invited participants, on an annual basis. The second in this series was held in February 1986, chaired by Dr. David P. Smith of 3M.

At 3M, Mr. Youngquist is a corporate scientist with the Memory Technologies Group laboratories. His particular expertise lies in high-density magnetic recording in the machine area and the recording system, both encoding and decoding.

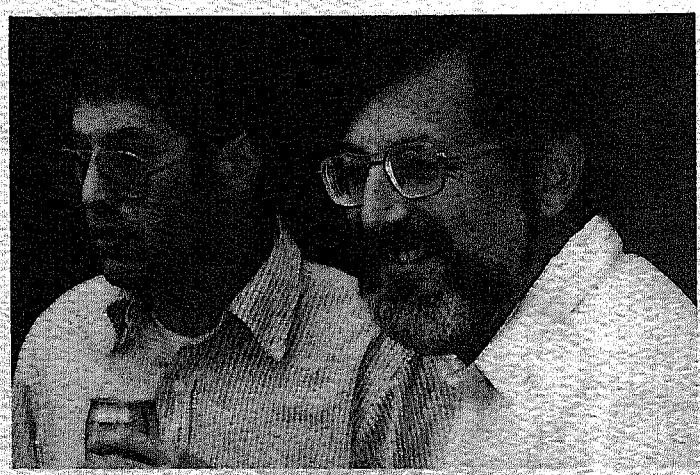
While at the Center, Mr. Youngquist will work closely with CMRR's Dr. Jack Wolf. He will be particularly concerned with helping students implement theories of coding into the practical hardware environment. To date, assisting with setting up the teaching laboratories and equipment selection has occupied much of Mr. Youngquist's time. 3M has donated two high-density recorders for use in the teaching laboratories.

At the end of April, Bob Youngquist will address the Magnetics Society, San Diego Chapter on digital audio recording.

Magnetic Field Analysis Workshop

February 10-12 saw the first of the CMRR workshops to be held in the Center's recently completed facility on the University of California, San Diego campus. Some twenty-five invited participants, approximately half from academe and half from sponsoring companies of the Center, attended the two and one-half day seminar. Chaired by Dr. H. Neal Bertram, "Applications of Magnetic Field Analysis to Problems in Magnetic Recording" is the first of a planned annual series.

The workshop opened with an introductory session by Neal Bertram, CMRR and Gordon Hughes, Seagate Technology, focusing on important problems in magnetic recording. Two following sessions dealt with two major numerical techniques used to look at these problems, namely integral equations and the finite element method. Discussion centered on latest developments in these techniques. The fourth session looked at modelling the physics of the recording process. The success of the workshop was evident in the comments elicited in the wrap-up session. Future workshops continuing this theme on an annual basis were suggested, with more emphasis on the physics of the recording process.



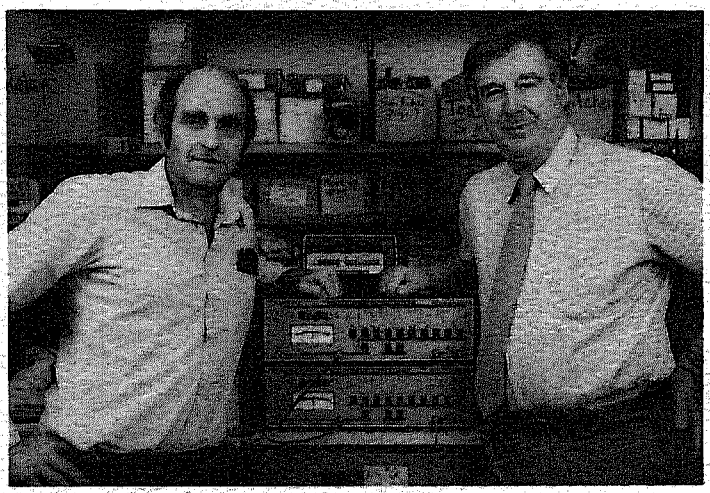
Dr. Dan Bloomberg, Dr. H. Neal Bertram

UCSD Receives IEEE Magnetics Society Equipment Grant

The IEEE Magnetics Society recently awarded UCSD an equipment grant of $6,884, which was used to purchase two PAR amplifiers, needed for a True Dual Axis VSM. The proposal was prepared by Dr. Sheldon Schultz, with Professors D. R. Fredkin and S. B. Oseroff named as co-principal investigators.

The VSM will be used in conjunction with the Department of Physics' new program on magnetic recording research. As well as allowing routine hysteresis and magnetization measurements, it will have the novel feature of being a dual axis instrument. It will have two full sets of coils in the Mallinson configuration, and hence will be able to read the magnetization in two perpendicular directions simultaneously. The vibrating drive and associated electronics have already been completed. System sensitivity of 10^{-5} emu is expected. Since it is to be a dual axis magnetometer with simultaneous readout, two independent amplifiers and detection channels were needed.

The VSM is being built by graduate students under the supervision of Professors Schultz and Oseroff. It will be used by them and other members of the Center for Magnetic Recording Research. One of their projects is devoted to a detailed understanding of the origins of hysteresis in magnetic tape and recording media. They expect to make extensive investigations of deviations from Stoner-Wohlfarth type of behavior. This was partly the motivation for developing the true dual axis VSM. Other experiments planned include measurements of anisotropy constants of sputtered Co-Cr, as well as other magnetic media.



Dr. Sheldon Schultz, Mr. John C. Mallinson

Surveillance of Japanese Literature Augmented

To supplement the Information Center's own surveillance of current Japanese research in magnetic and optical recording, we have recently taken a subscription to a new service published by University Microfilms—Japanese Technical Information Service.

This three-part publication is published monthly and covers over 750 Japanese scientific and technical journals. As well as listing the contents of each journal, an informative abstract has been prepared.

Articles pertinent to CMRR's field of interest will be selected from this broadly based publication and included in the monthly current awareness bulletin, which the Information Center distributes to faculty and members of the sponsoring companies.

Further details can be obtained from Dawn Talbot, (619) 452-6213.

From the Director

On December 30, 1985, we moved into our new, but incomplete, building. Despite the usual travails and temperature extremes we are now functional again. The magnitude of our activities can be inferred from the facts that we now have thirty-five graduate students and seventeen classes listed in the '86-'87 UCSD course catalog.

On March 28, Frank Talke of IBM Research, San Jose will join us as our third endowed CMRR professor. Frank's outstanding contributions to several mechanical aspects of both tape and disc recording systems are both well known and detailed elsewhere in this Report.

It is my particular pleasure to announce that Temescal of Berkeley have donated one of their Magnesette-100 production sputtering systems. This unit has three externally mounted targets which permit both dc (35KW) and r.f. (4KW) sputtering.

The organization of small, interactive workshops on specialist topics is a unique role which CMRR performs, bringing together experts from academe and industry. Recent workshops have included "Magnetic Materials," December 9-11, "Applications of Magnetic Field Analysis to Problems in Magnetic Recording," February 10-12, and "Wear, Friction and Lubrication," February 24-26; all have been rated by the participants as great successes.

On December 2-3, CMRR and UC Extension held a two day seminar on "Advanced Topics in Magnetic Recording" which was attended by eighty-seven people. On January 3, the Electrical Engineering and Computer Sciences Department held a one-day "Colloquium on Communications and Signal Processing" and I rejoice to inform you that the two speakers on magnetic recording (Jack Wolf and I) were rated as having given the most interesting talks! Further proof, if proof be needed, that magnetic recording technology is both an intellectually stimulating and industrially critical field of endeavor.

Last November, Kitty Morris left CMRR due to ill health. Her former duties were divided between Phebe Cohen, now assistant to the director, and Mary LaBlue, now accounting supervisor.

John C. Mallinson

Magnetic Recording Materials Workshop

The Center for Magnetic Recording Research sponsored a workshop on Magnetic Recording Materials, which was held in San Diego, December 8-11, 1985. The workshop was organized by CMRR visiting scholar Dr. Ian Croll, on sabbatical from IBM, San Jose.

Invited participants were drawn from U.S. university, industrial and governmental laboratories, all actively engaged in research on materials relevant to magnetic recording. The main objectives of the workshop were to provide an informal and interdisciplinary forum for discussion of recent research results, and to identify fruitful areas for further academic research in magnetic recording.

Feedback from the participants indicated that the workshop provided a unique opportunity for researchers with common interests in magnetic recording, but in different academic disciplines, to meet and exchange ideas. Strong interest was expressed in holding future workshops in this area on an annual basis.

Intermag '86 Conference

The twenty-fourth International Magnetics Conference, sponsored by the Magnetics Society of the IEEE, will be held at the Hyatt-Regency Hotel in Phoenix, Arizona from Monday, April 14 to Thursday, April 17, 1986. The purpose of the twenty-fourth International Magnetics Conference is to provide a forum for presentation of new developments in applied magnetics, related magnetic phenomena, and information storage techniques. In addition to the contributed papers, there will be invited papers, sessions wherein competing technologies can be assessed, tutorial sessions, and workshops for less formal discussion of timely and/or controversial topics. Special emphasis will be placed on applications-oriented topics in the above as well as in the contributed papers. Topics of wide interest in recent years have included all aspects of magnetic recording, various magnetic and other memory technologies, microwave magnetics, electronic transformers, permanent magnet materials and technologies, control and power conversion and conditioning, magnetometry and transducers, magnetic separation, magnetic levitation and drives, magnet field calculations, and magnetic materials—properties and processing.

There will be a one-day tutorial on magnetic recording on the Sunday preceding the conference.

Individuals may obtain details by contacting either the conference chairman, J. U. Lemke, 2400 Sixth Avenue #1103, San Diego, CA 92101, or the publicity chairman, J. A. Nyenhuis, School of Electrical Engineering, Purdue University, West Lafayette, IN 47907, (317) 494-3524.

Information Center Seeks Donations of Material

The Information Center is attempting to assemble a comprehensive collection of the literature of magnetic recording. Since many of the earlier published works are now out of print and proving difficult to obtain from commercial sources, we would be very grateful if anyone who has books no longer needed would be willing to donate to this highly specialized collection. We are also interested in purchasing suitable collections. Please contact Dawn Talbot at the Center, (619) 452-6213 with any information you may have.

CALENDAR

This section includes forthcoming conferences, meetings, symposia, special courses, etc., related to magnetic recording.

March 27	Dedication Ceremony, Center for Magnetic Recording Research, UCSD
April 14-17	INTERMAG '86, Phoenix, Arizona
April 21-24	Short Course in Magnetic Recording Technology, University Extension
April 29	Magnetics Society Lecture, CMRR, 7-9 p.m. Speaker: Bob Youngquist
May 22	Magnetics Society Lecture, CMRR, 7-9 p.m. Speaker: Professor Johann Oesterreicher
September 2-5	MRM '86 International Conference on Magnetic Recording Media, Parma, Italy

For further information: (619) 452-6198. Please send notices of meetings, etc. to the editor.

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