**TABLE OF CONTENTS**

APPLICATION OF RECENT ROTOR DYNAMICS DEVELOPMENTS TO MECHANICAL DRIVE TURBINES ................................................................. 1
William J. Caruso, Department Staff Engineer, Mechanical Research and Analysis; Bruce E.
Gans, Senior Engineer — Bucket and Rotor Development, William G. Catlow, Manager — Bucket and Rotor Development, Mechanical Drive Turbine Department, General Electric Company, Fitchburg, Massachusetts

ROTOR DYNAMICS ANALYSIS AND BEARING OPTIMIZATION STUDY OF A 3800 HP STEAM TURBINE .......................................................... 19
Dana J. Salamone, Chief Engineer, Centritech Corporation, Houston, Texas

STEAM TURBINE BLADE DESIGN OPTIONS, HOW TO SPECIFY OR UPGRADE .......................................................... 29
Helmut G. Naumann, Turbomachinery Consultant, Skillman, New Jersey

PERFORMANCE IMPROVEMENT OF MECHANICAL DRIVE STEAM TURBINES ............................................................................................................. 51
Hisakuni Takenaga, Senior Research Engineer; Kazuo Katayama, Manager; Kazuo Iida, Engineer, Mitsubishi Heavy Industries, Ltd., Hiroshima, Japan

ABRADABLE SEALS IN TURBOMACHINERY ......................................................................................................................... 61
William G. Hoppock, Supervisor, Compressor Applications Engineering; Kenneth G. Van Bramer, Supervisor, Compressor Design Engineering; Joseph A. Silvaggio, Jr., Senior Engineer, Transamerica Delaval, Inc., Trenton, New Jersey

NEW DEVELOPMENTS IN CENTRIFUGAL COMPRESSORS .................................................................................................................. 69

AEROTHERMAL & MECHANICAL HEALTH MONITORING & DIAGNOSTICS OF TURBO-COMPRESSOR SETS ............................................................................................................. 75
Dr. Meherwan P. Boyce, President; Cyrus B. Meher-Homji, Engineering Consultant, Boyce Engineering International, Inc., Houston, Texas

RESIDUAL OIL BURNING EXPERIENCE AT THE PUTNAM PLANT OF FLORIDA POWER & LIGHT COMPANY ............................................................................................................. 95
William J. Hensler, Operations Superintendent, Florida Power & Light Company, East Palatka, Florida

EFFICIENCY: THE SILENT PARTNER OF MACHINE PERFORMANCE .................................................................................................................. 105
Dr. David Japikse, President, Concepts ETI, Inc., Norwich, Vermont

SHOP FULL-LOAD TESTING OF CENTRIFUGAL COMPRESSORS ........................................................................................................ 113
Angelo Maretti, Functional Test Department Mechanical Engineer; Pierluigi Nava, Functional Test Department Manager; Mauro Giovannini, Manager of Design and Engineering Centrifugal, Axial Compressor and Steam Turbine Division, Nuovo Pignone, Italy

SPECIAL PAPERS ........................................................................................................ 121
ADVANCED TECHNOLOGIES FOR TURBOMACHINERY — AN OVERVIEW ............................................................................................................. 123
Melvin J. Hartmann, National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio

THE CALCULATION AND VERIFICATION OF TORSIONAL NATURAL FREQUENCIES FOR TURBOMACHINERY EQUIPMENT STRINGS ............................................................................................................. 151
Roy E. Mondy, Mechanical Equipment Specialist; John Mirro, Design Engineer, Ingersoll-Rand Company, Phillipsburg, New Jersey

CONTINUOUS MONITORING SYSTEMS FOR HIGH SPEED GEARING ........................................................................................................ 157
John S. Mitchell, President, John S. Mitchell Inc., San Juan Capistrano, California

PREROTATION AND FLUID RECIRCULATION IN THE SUCTION PIPE OF CENTRIFUGAL PUMPS ............................................................................................................. 165
F. A. E. Breugelmans, Professor and Head of Turbomachinery Department; M. Sen, Assistant at Istanbul Technical University, Turkey
TWO-PHASE MECHANICAL FACE SEAL OPERATION: EXPERIMENTAL
AND THEORETICAL OBSERVATIONS ....................................................... 181
Alan O. Lebeck, Professor, Mechanical Engineering Department, University of New Mexico,
Albuquerque, New Mexico; Bing-Ching Chiou, Research Assistant, Bechtel Corporation,
Taiwan, Republic of China

INLET FLOW AND ASPECTS OF CAVITATION IN CENTRIFUGAL IMPELLERS .......... 189
Masao Oshima, Manager, Pump Research and Development Center, Haneda Plant, Ebara
Corporation, Tokyo, Japan

TUTORIUM LEADERS AND PAPERS ............................................................ 195

PANEL MEMBERS AND PAPERS ............................................................... 213

DISCUSSION LEADERS ........................................................................ 219

SPECIAL EVENTS SPEAKERS .................................................................. 227

ADVISORY COMMITTEE ......................................................................... 229

EXHIBITORS ......................................................................................... 233

TURBOMACHINERY LABORATORIES ...................................................... 241