

# CONTENTS

## SECTION 1: FLUID MECHANICS

|                                                                                                                                                               |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| A Hybrid Panel Method for Aerofoil Aerodynamics<br><i>D. Mateescu</i>                                                                                         | 3  |
| High Subsonic Flow Past a Steady Two-Dimensional Lifting Airfoil<br><i>W. Ogana</i>                                                                           | 15 |
| The Boundary Element Method for Solving Separated Inviscid Flows<br><i>D.B. Ingham, X. Wen</i>                                                                | 25 |
| Time Domain Boundary Element Analysis of Unsteady Aerodynamics for Finite State Modeling<br><i>S. Suzuki, K. Kadota</i>                                       | 37 |
| Stratified Flows of Newtonian Viscous Liquids<br><i>M.B. Bush</i>                                                                                             | 51 |
| Boundary Element Approach to Viscous Flow Problems Based on the Time Splitting Technique<br><i>K. Kakuda, N. Tosaka</i>                                       | 63 |
| Numerical Analysis of the Behaviour of a Cavitation Bubble near a Vibrating Rigid Wall by the Boundary Integral Method<br><i>K. Sato, Y. Tomita, A. Shima</i> | 73 |
| Combined Forced and Free Laminar Convection in the Entrance Region of a Tube<br><i>I. Zagar, L. Skerget, A. Alujevic, M. Hudina</i>                           | 85 |
| Numerical Solutions of Three-Dimensional Incompressible Viscous Flow by the Integral Equation Method<br><i>N. Tosaka, K. Kakuda, H. Sato</i>                  | 93 |

## SECTION 2: FREE SURFACE PROBLEMS

|                                                                                                      |     |
|------------------------------------------------------------------------------------------------------|-----|
| Boundary Element Analysis of Unsteady Nonlinear Surface Wave on Water<br><i>R. Sugino, N. Tosaka</i> | 107 |
| Nonlinear Water Waves Generated by an Accelerated Floating Body<br><i>K. Mizumura</i>                | 119 |
| Boundary Element Analysis of Free Surface Problems of Axisymmetric Taylor Bubbles*<br><i>W-Q. Lu</i> | 131 |

## SECTION 3: ACOUSTICS

|                                                                                                                                                                    |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Computer Simulation of Active Noise Control by the Boundary Element Method<br><i>M. Tanaka, Y. Yamada, M. Shirotori</i>                                            | 147 |
| Prediction of Normal Sound Absorption Coefficient for Multi-Layer Sound Absorbing Materials by Using BEM<br><i>H. Utsuno, T. Tanaka, Y. Morisawa, T. Yoshimura</i> | 159 |
| Applications of the FEM and BEM in Structural Acoustics<br><i>A.F. Seybert, T.W. Wu, W.L. Li</i>                                                                   | 171 |
| Sound Transmission through a Panel on an Infinity Rigid Baffle<br><i>H. Kawabe</i>                                                                                 | 183 |
| Transient Acoustic Field Analysis by a Boundary Element Model - Two Dimensional Case<br><i>T. Murai, M. Fukuda, Y. Kagawa</i>                                      | 193 |

## SECTION 4: SENSITIVITY ANALYSIS AND OPTIMIZATION

|                                                                                                                                                              |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Design Sensitivity Formulation of Boundary Stresses Using Boundary Integral Equation for Displacement Gradients<br><i>T. Matsumoto, M. Tanaka, H. Hirata</i> | 205 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|

|                                                                                                                                                                      |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Shape Design Sensitivity Analysis of Thermoelasticity Problem Using the Boundary Integral Equation Formulation<br><i>B.M. Kwak, B.Y. Lee</i>                         | 215 |
| A Unified Approach in Shape Design Sensitivity Analysis of Elastic Structures in the Boundary Integral Equation Formulation<br><i>J.H. Choi, B.M. Kwak, D.H. Lee</i> | 225 |
| Boundary Element Optimum Design of Machine Elements<br><i>N. Kamiya, E. Kita</i>                                                                                     | 237 |
| A Finite Difference Based Approach to Shape Design Sensitivity Analysis<br><i>Z. Zhao, R.A. Adey</i>                                                                 | 249 |

## SECTION 5: ELECTROMAGNETICS

|                                                                                                                                                        |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| A Study on Two Scalar Potentials BEM for 3D Magnetostatic Field Calculation<br><i>K. Sawa, K. Ohta</i>                                                 | 269 |
| Computation of Electromagnetic Field Boundary Value Problems by using a Modified Boundary Element Method<br><i>W. Hong</i>                             | 283 |
| Improved Boundary Element Formulation using Scalar Potential in Hybrid BE-BF Method Applied to Electromagnetic Problems<br><i>T. Onuki, S. Wakao</i>   | 295 |
| A Treatment for the Multiplicity of Flux on Edge in 3D BEM Analysis using Higher Order Conforming Elements<br><i>T. Takeda, T. Kuwahara, T. Miyata</i> | 307 |
| Computational Accuracies of the Boundary Element Method Using Vector Variables in Electromagnetic Problems<br><i>M. Tanaka, H. Tsuboi, T. Misaki</i>   | 317 |
| An Iterative Technique for 3-D Eddy Current Analysis by BEM<br><i>K. Ishibashi</i>                                                                     | 329 |

|                                                                                                                                                      |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Field Analysis of MPD Thrusters using the Boundary Element Method<br><i>T. Honma, H. Igarashi, S. Sawai</i>                                          | 341 |
| Axissymmetric Analysis of Boundary Plasma by Regular Boundary Element Methods<br><i>A. Tsuchiya, A. Yoneta, H. Igarashi, T. Honma, M. Tsuchimoto</i> | 353 |
| Resistance and Current Density Distribution in Anisotropic Carbon Brushes on Moving Electrical Machine Rotor<br><i>A. Kost, J. Shen</i>              | 365 |
| Numerical Analysis of <i>H</i> -Plane Waveguide Junctions by the Combination of Finite and Boundary Elements<br><i>K. Ise, M. Koshiba</i>            | 375 |
| Numerical Analysis of Reflector Antennas by a Moment Method<br><i>M. Analoui, H. Tsuboi, T. Nakata</i>                                               | 387 |

## SECTION 6: INVERSE PROBLEMS

|                                                                                                                                       |     |
|---------------------------------------------------------------------------------------------------------------------------------------|-----|
| The Solution of Improperly Posed Problems using the Boundary Element Method<br><i>D.B. Ingham, Y. Yuan</i>                            | 401 |
| Detection of Cracks in Structural Components by the Elastodynamic Boundary Element Method<br><i>M. Tanaka, M. Nakamura, T. Nakano</i> | 413 |
| Regularised BIEs for Crack Shape Determination Problems<br><i>N. Nishimura, S. Kobayashi</i>                                          | 425 |
| Inverse Scattering in 2D for Shape Identification by BEM<br><i>K. Onishi, Y. Ohura, K. Kobayashi</i>                                  | 435 |

## SECTION 7: ENGINEERING APPLICATIONS

|                                                                                                       |     |
|-------------------------------------------------------------------------------------------------------|-----|
| An Object-Oriented Modelling Environment for the Boundary Element Method<br><i>K.H. Lee, K.W. Tan</i> | 449 |
|-------------------------------------------------------------------------------------------------------|-----|

|                                                                                                                                                                    |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| A Partitioning Solution of Non-Symmetrical Fully Populated Matrix System in the Boundary Element Method and its Subroutines<br><i>R-Y. Cai, Z-J. Zeng, F. Chen</i> | 463 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|

|                                                                                                                                                                                                          |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| HYB&F - A General Structural Analysis Program for the Consideration of Finite Elements and Hybrid Boundary Elements using an Advanced Substructuring Technique<br><i>N.A. Dumont, M.T.M. de Carvalho</i> | 477 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|

|                                                                                                   |     |
|---------------------------------------------------------------------------------------------------|-----|
| The Boundary Element Analysis System - SURFES<br><i>T. Tsuta, S. Yamaji, T. Tanizawa, H. Isha</i> | 489 |
|---------------------------------------------------------------------------------------------------|-----|

|                                                                                                             |     |
|-------------------------------------------------------------------------------------------------------------|-----|
| Computer Simulation of the use of Geotextiles in Hydraulic Works<br><i>E. Bruch, A. Lejeune, B. Mergeai</i> | 503 |
|-------------------------------------------------------------------------------------------------------------|-----|

|                                                                                                                    |     |
|--------------------------------------------------------------------------------------------------------------------|-----|
| Influence of Flexible Foundation on the Incrementally Constructed Embankments<br><i>M. Rahbari, Dj. Modjtahedi</i> | 513 |
|--------------------------------------------------------------------------------------------------------------------|-----|

## SECTION 8: PRE- AND POST- PROCESSING

|                                                                   |     |
|-------------------------------------------------------------------|-----|
| An Attempt of Boundary Elements<br><i>N. Kamiya, K. Kawaguchi</i> | 527 |
|-------------------------------------------------------------------|-----|

|                                                                                                                        |     |
|------------------------------------------------------------------------------------------------------------------------|-----|
| Error Estimator for Boundary Element Analysis by using the Direct Regular Method<br><i>R. Yuuki, G-Q. Cao, S. Ueda</i> | 539 |
|------------------------------------------------------------------------------------------------------------------------|-----|

|                                                                                                                                                                                                         |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| An Integrated Program for the Interactive Graphic Pre- and Post-Processing of Structures Consisting of Finite Elements and Hybrid Boundary Elements<br><i>N.A. Dumont, M.E. de Carvalho, M. Gattass</i> | 551 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|

|                                                                                                    |     |
|----------------------------------------------------------------------------------------------------|-----|
| A Real-Time Graphics Simulation System for Numerical Aerodynamics<br><i>H. Uenoyama, Y. Tanaka</i> | 563 |
|----------------------------------------------------------------------------------------------------|-----|