

Table of Contents

Editorial Note

Chapter 1: Energy Conversion

Design of a Bubbling Fluidized Bed Gasifier for the Thermochemical Conversion of Oil Palm Empty Fruit Bunch Briquette A. Johari, B.B. Nyakuma, A. Ahmad, T.A.T. Abdullah, M.J. Kamaruddin, R. Mat and A. Ali	3
Laminar Flow Past a Circular Cylinder: Reduction of Drag and Fluctuating Lift Using Upstream and Downstream Rods D.Z. Noor, E. Widiyono, Suhariyanto, L. Rusdiyana and J. Sarsetiyanto	9
Trans-Esterification of Triglycerides with Methanol on Sulfated Zirconia Prepared with Different Concentration of Sulfuric Acid R. Mat, R.A. Samsudin, M. Mohamed, A. Johari, M.J. Kamaruddin and A. Ali	15
Numerical Studies on R22 Refrigerant Compressor Using Environment Friendly Working Fluids K.G.S. Shreenaath, J. Golecha, L.B. Augustin and M. Suresh	21
Case Studies Thermal Analysis of HP Condensate Stabilizer Column M. Qirom, A. Indarto and I.A. Putrawan	27
The Influence of Hydrogen Addition to Diesel Fuel Spray Combustion for Different Atomization Conditions N. Sriwardani, Y. Okamoto, T. Seo and M. Mikami	33
Hydrogen Production from Acetic Acid Steam Reforming over Bimetallic Ni-Co on La₂O₃ Catalyst-Effect of the Catalyst Dilution T.A. Tuan Abdullah, W. Nabgan, M.J. Kamaruddin, R. Mat, A. Johari and A. Ahmad	39
Driving Efficiency through Hydrocarbon for Green Car Air Conditioning A.A. Dahlan, H. Nasution, A.A. Aziz, Z.A. Latiff, M.R.M. Perang and A.Y. Wan Mohd	45
Air to Air Ejector with Various Divergent Mixing Chambers V. Dvořák	50
Kamojang Geothermal Power Plant Unit-1 : 30 Years of Operation R. Adiprana, D.S. Purnomo and I. Setiono	56
Flow Visualization Pattern on Sharp Edge T-Junction through Dividing Flow Channel Y.B. Lukiyanto, I.N.G. Wardana, W. Wijayanti and M.A. Choiron	62
An Experimental Study on the Vertical Flow Past a Finite-Length Horizontal Cylinder at Low Reynolds Numbers W. Stevanus and Y.J.P. Lin	68
Effect of Air Conditioning Position on Thermal Comfort in the Floor Air Conditioning System Y.A. Sabtalistia, S.N.N. Ekasiwi and B. Iskandriawan	74
Computational Fluid Dynamic Using Parallel Loop of Multi-Cores Processor C.L. Siow, Jaswar and E. Afrizal	80
Experimental Studies on a Solar Air Heater Having V-Corrugated Absorber Plate with Obstacles Bent Vertically E.A. Handoyo, D. Ichsan, P. Prabowo and S. Sutardi	86
Energy Savings in Air Conditioning System Using Ejector: An Overview K. Sumeru, L. Martin, F.N. Ani, H. Nasution and F.N. Ani	93
Empirical Correlations for Sizing Adiabatic Capillary Tube Using LPG as Refrigerant in Split-Type Air-Conditioner S. Sulaimon, A.A. Aziz, A.N. Darus and H. Nasution	99
Validation of AWTsim as Aerodynamic Analysis for Design Wind Turbine Blade I.K. Wiratama	105
Numerical Study on the Influence of the Corner Curvature of Circular Micropillar on Microdroplet Size via a Dewetting Process B. Dwiyanoro	111

Redesign ITS Central Library through Smart Building M. Junaidi, K. Parindra, H. Ardhyanta, A. Bachtiar and A.A. Dimas	117
Optimization of Maximum Lift to Drag Ratio on Airfoil Design Based on Artificial Neural Network Utilizing Genetic Algorithm I. Haryanto, T.S. Utomo, N. Sinaga, C.A. Rosalia and A.P. Putra	123
Carbon Dioxide Effects on the Flammability Characteristics of Biogas N. Hamidi	129
Heat Transfer Effectiveness and Coefficient of Pressure Drop on the Shell Side of a Staggered Elliptical Tubes Bank U.K.W. Budi, K. Samsul, Suhanan and I.M. Suardjaja	134
Experimental Study on the Effect of Reynolds Number Variation on Drag Force for Various Cut Angle on D-Type Cylinders A. Pudjanarsa and A. Ardawalika	140
Performance of Conical Diffuser on Liquid Jet Gas Ejector D. Sugati, Indarto, Purnomo and Sutrisno	145
An Investigation into the Effect of Drag Coefficient on Overtaking of Car S.S. Al Homoud, D. Harmanto and I. Oraifige	151
Effects of Pine Oil on Dynamics of Bubble in Froth Flotation Warjito and I.P.A. Kautsar	155
Study on Auto-Ignition Behavior of Lubricating Oil in a Cone Calorimeter M.A.M. Siregar and Y.S. Nugroho	161
Solar Driven Absorption Chiller for Medium Temperature Food Refrigeration, a Study for Application in Indonesia I.N. Suamir	167
The Effect of Water Droplet Size on the Extinguished Concentric Jet Premixed and Diffusion Flame M.N. Sasongko	173
Gaining the Enthalpy of Solid Yields Formation in the Process of Waste Pyrolysis W. Wijayanti	179
Pipeline Leak Detection in Two Phase Flow Based on Fluctuation Pressure Difference and Artificial Neural Network (ANN) B. Santoso, Indarto and Deendarlianto	186
Reduction of Drag Force on a Circular Cylinder and Pressure Drop Using a Square Cylinder as Disturbance Body in a Narrow Channel W.A. Widodo and R.P. Putra	192
Experimental Study of Drag Reduction on Circular Cylinder and Reduction of Pressure Drop in Narrow Channels by Using a Cylinder Disturbance Body W.A. Widodo and N. Hidayat	198
Flammability Limit and Flame Visualization of Gaseous Fuel Combustion Inside Meso-scale Combustor with Different Thermal Conductivity L. Yuliati, M.N. Sasongko and S. Wahyudi	204
Energy Conversion in Compliance of Energy Self-Sufficient Village Program. Case Study: Jarak Village C. Meidiana, I.R.D. Ari and E.P. Paramita	210
Parallel Speed-Up of Preconditioned Fractional Step Navier-Stokes Solvers V. Djanali, S.W. Armfield, M.P. Kirkpatrick and S. Norris	215
Reactive Mixing Behavior of the Nitration of Glycerin in a Stirred Vessel at Various Perturbation R. Wulandari, I.N.G. Wardana, S. Wahyudi and N. Hamidi	221
Thermodynamic Analysis of Ejector as an Expansion Device on Split-Type Air Conditioner Using R410A as Working Fluid K. Sumeru, H. Nasution and F.N. Ani	227
Experimental Investigation on the Use of Secondary Refrigerant in Freezer for Energy Savings A.P. Haryono, E. Sukamto, K. Sumeru and F.N. Ani	233
Investigation of Natural Gas Composition Effects on Knock Phenomenon in SI Gas Engines Using Detailed Chemistry A. Javaheri, V. Esfahanian, A. Salavati-Zadeh, M. Darzi and S.M. Mirsoheil	239

Flow Characteristics around Four Circular Cylinders in Equispaced Arrangement near a Plane Wall	
A.G. Wailanduw, T. Yuwono and W.A. Widodo	245
Experimental Study on the Performance of In-Cabin Ventilation System	
A.L. Zulkarnain, C.W. Soon, B. Supriyo, M.R. Mohd Perang, H. Nasution and A.A. Aziz	251
Reduction of Energy Losses in the End Wall Junction Area through the Addition of Forward Facing Step Turbulent Generator	
H. Mirmanto, Sutrisno, H. Sasongko and D.Z. Noor	256
Biogas Potential of Co-Substrates in Balinese Biogas Plants	
D. Nett, I.N.S. Winaya, I.M.A. Putrawan, R. Wartmann and W. Edelmann	262
CFD Simulation of Heat Transfer in Fluidized Bed Reactor	
I.N.S. Winaya, I.M.A. Putrawan, I.N.G. Sujana and M. Sucipta	267
Influence of Bioethanol-Gasoline Blended Fuel on Performance and Emissions Characteristics from Port Injection Sinjai Engine 650 cc	
B. Sudarmanta, S. Darsopuspito and D. Sungkono	273
Improved Energy Saving for R22 Building Air Conditioning Retrofitted with Hydrocarbon Refrigerant, Study Case: Civil Engineering Department of ITS	
Widyastuti, A.B.K. Putra, R. Hantoro, E. Novianarenti and A.G. Safitra	281
The Evaluation of a Rigid Sail of Ship Using Wind Tunnel Test	
A. Sulisetyono	287
High-Efficiency Shrouded Micro Wind Turbine for Urban-Built Environment	
B.Y. Kosasih and S.A. Jafari	294
Production of Ethanol as a Renewable Energy by Extractive Fermentation	
T. Widjaja, A. Altway, A.R. Permanasari and S. Gunawan	300
Kerosene-Water Flow Pattern in T-Junction Vertical Diameter Ratio 0.5 (Variation of Inclination Branch)	
D. Puspitasari, Indarto, Purnomo and Khasani	306

Chapter 2: Mechanical Design

Modeling and Analysis of Hybrid Shock Absorber for Military Vehicle Suspension	
H.L. Guntur, W. Hendrowati and T. Budiarto	315
Design Online Artificial Gain Updating Sliding Mode Algorithm: Applied to Internal Combustion Engine	
A. Priyanto, M.J. Nekooei and Jaswar	321
Optimization Spring Coil Design for Orthodontic Tooth Movement	
M.A. Choiron, E. Sutikno, T.H. Wicaksono and S. Haruyama	327
Thermal Stress Intensity Factors of Crack in Solid Oxide Fuel Cells	
K. Anam and C.K. Lin	331
Intelligent Bearing Diagnostics Using Wavelet Support Vector Machine	
A. Widodo, I. Haryanto and T. Prahasto	337
Degradation Trend Estimation and Prognosis of Large Low Speed Slewing Bearing Lifetime	
B.Y. Kosasih, W. Caesarendra, K. Tieu, A. Widodo, C.A.S. Moodie and A.K. Tieu	343
Electrical Energy from Vibration of a Washing Machine	
B.D. Wonoyudo and T. Febrawi	349
Computer Assisted Fracture Reduction and Fixation Simulation for Pelvic Fractures	
P.Y. Lee, J.Y. Lai, C.Y. Huang and Y.S. Hu	354
Structural Analysis of a Tracking Photovoltaic System with a Pedestal Solar Tracker	
C.K. Lin and C.Y. Dai	361
New Polyhedral Elements Based on Virtual Node Method for Solid Mechanics and Heat Transfer Applications	
L. Perumal and M.I. Fadhel	367
Experimental Study of Vibration of Prototype Auditory Membrane	
H. Tanujaya and S. Kawano	372
Interaction between a Crack and an Isotropic Tri-Material Media in Anti-Plane Elasticity	
A. Wikarta and C.K. Chao	378

Split Bar Hopkinson with Springs Striker Bar Launcher A.S. Pramono, Sujarwanto and H. Rivazani	383
Neural Network-Based Engine Propeller Matching (NN-EPM) for Trimaran Patrol Ship E.S. Koenhardono, E.B. Djatmiko, A. Soeprijanto and M.I. Irawan	388
Modeling, Prototyping and Testing of Regenerative Electromagnetic Shock Absorber A.I. Sultoni, I.N. Sutantra and A.S. Pramono	395
Designing and Prototyping Surveillance Robot with Self-Protection Using Nail Gun N. Sebastian, Erwin, E. Listijorini and Dwinanto	401
Numerical Modelling of the Initial Stress and Upward Deflection of Glulam Beams Pre-Stressed by Compressed Wood B. Anshari and Z.W. Guan	408
Modular System for Testing the Performance of Poly-Articulate Robotic Structures V.C. Contoloru	414
Preliminary Numerical Study on Designing Navigation and Stability Control Systems for ITS AUV T. Herlambang, H. Nurhadi and Subchan	420
Numerical Study of Salat Movements for Total Hip Replacement Patient R. Ismail, E. Saputra, M. Tauviquirrahman, A.B. Legowo, I.B. Anwar and J. Jamari	426
Physiological Concept: Visible Modeling for Feasible Design C.P.M. Sianipar, G. Yudoko and K. Dowaki	432
Actuator Power Consumption of Active Suspension System with Override Control Strategy U.W. Wasiwitono	438
Trailing Edge Deformation Mechanism for Active Variable - Camber Wind Turbine Blade B.Y. Kosasih and M. Dicker	444

Chapter 3: Manufacturing Processes and Technologies

Effect of Material and Process Parameter on Dimensions of Rolled External Threads P.S. Chauhan, C.M. Agrawal and R.K. Dwivedi	453
The Emergy Value Assessment of Municipal Waste Management in Yogyakarta, Indonesia C. Meidiana	461
Evaluation of the Effect of Application of Air Jet Cooling and Cooled-Air Jet Cooling on Machining Characteristics of St 60 Steel Rusnaldy, N. Iskandar, Y. Umardani, Paryanto and S.A. Widyanto	468
Simulation of Semi-Active the Blank Holder Force Control to Prevent Wrinkling and Cracking in Deep Drawing Process S. Candra, I.M.L. Batan, W. Berata and A.S. Pramono	473
System Architecture and FPGA Embedding of Compact Fuzzy Logic Controller for Arm Robot Joints B. Siswoyo, M.A. Choiron, Y.S. Irawan and I.N.G. Wardana	480
Organizational Culture in Manufacturing Company: Study Case of Small and Medium Sized Enterprises in Central Java, Indonesia H. Lestari, R. Ismail and A. Mansur	486
Development Machining of Titanium Alloys: A Review M. Darsin and H.A. Basuki	492
Modal and Harmonic Response Analysis: Linear-Approach Simulation to Predict the Influence of Granular Stiffeners on Dynamic Stiffness of Box-Shaped Workpiece for Increasing Stability Limit against Chatter O. Soegihardjo, S. Suhardjono, B. Pramujati and A.S. Pramono	501
The Preliminary Research of Drill Guide Template Design for Pedicle Screw Placement with a Low-Cost 3D Pinter C.Y. Liao, C.J. Cheng, W.J. Huang and C.M. Cheng	507
Experimental-Based TGPID Motion Control for 2D CNC Machine H. Nurhadi, Subowo, S. Hadi and M. Mursid	511
Preliminary Study on Magnetic Levitation Modeling Using PID Control D.A. Patriawan, B. Pramujati and H. Nurhadi	517

Multiple Performance Optimization in the Wire EDM Process of SKD61 Tool Steel Using Taguchi Grey Relational Analysis and Fuzzy Logic N. Lusi, B.O.P. Soepangkat, B. Pramujati and H. Agustin	523
Optimization of Recast Layer Thickness and Surface Roughness in the Wire EDM Process of AISI H13 Tool Steel Using Taguchi and Fuzzy Logic P. Rupajati, B.O.P. Soepangkat, B. Pramujati and H. Agustin	529
Optimization of Tool Wear, Surface Roughness and Material Removal Rate in the Milling Process of Al 6061 Using Taguchi and Weighted Principal Component Analysis (WPCA) L. Ulfiyah, B. Pramujati and B.O.P. Soepangkat	535
Design and Application of the Stretching Technology on the Welding Process of Stiffened Sheet Metal Structure H. Sukanto, Triyono and N. Muhayat	541
Effect of High Speed Dry End Milling on Surface Roughness and Cutting Forces of Ti-6Al-4V ELI S. Sharif, H. Safari, S. Izman and D. Kurniawan	546
Visible Light Maskless Photolithography for Biomachining Application D. Suwandi, Y. Whulanza and J. Istiyanto	552
Improvement of Tungsten Inert Gas (TIG) Welding Penetration Using the Effect of Electromagnetic Field A.S. Baskoro, Tuparjono, Erwanto, S. Frisman, A. Yogi and W. Winarto	558
Response of Grip Force as Effect of Electrics Power Input at Gripper Actuator of NiTi SM495 Wire T. Oerbandono and H. Budiarto	564
Image Processing Implementation in Measurement of Cross-Flow Water Turbine Geometry A. Wahjudi, I.M.L. Batan, B.M. Pradnyana and W. Rusweki	570
Application of Semi Automatic Model of Product Complexity Index Calculation by Identification and Recognition of Geometric Features Information H.D.S. Budiono, M. Sholeh, G. Kiswanto and T.P. Soemardi	576
Multiple Performance Characteristics Optimization in the Turning Process of AISI H13 Tool Steel Using Taguchi and Fuzzy Logic B.O.P. Soepangkat, B. Pramujati and B.W. Karuniawan	583
Numerical Simulation of Multipoint Forming with Circular Die Pins in Hexagonal Packing W. Rivai, P. Suwarta, B.L. Sanjoto, H. Nur and S. Hari	589
Design of Multi Gender Bicycle - As an Alternative Bike Design to Fulfill Appropriate Requirement for Urban Society in Indonesia I.M.L. Batan and R. Hendarto	594

Chapter 4: Material Science and Engineering

Sol-Gel Synthesis of Zn Doped HA Powders and their Conversion to Porous Bodies A. Naqshbandi, I. Sopyan, Gunawan and Suryanto	603
Synthesis and Characterization of Zinc Oxide Nanoparticles via Self-Combustion Technique P. Puspitasari, Andoko and E. Sutadji	609
Effect of Ingredients on Flexural Strength of Friction Composite J. Jamasri, V. Malau, M.N. Ilman and E. Surojo	615
Dielectric Properties for the Ring Opening Polymerisation of ϵ-Caprolactone M.J. Kamaruddin, M.A. Ahmad Zaini, A. Johari and T.A. Tuan Abdullah	621
P-h Curves and Hardness Value Prediction for Spherical Indentation Based on the Representative Stress Approach I.N. Budiarsa and M. Jamal	628
Simple Recipe to Synthesize BaTiO₃-BaFe₁₂O₁₉ Nanocomposite Bulk System with High Magnetization D. Suastiyantia, B. Soegijono and M. Hikam	634
Effect of Cellulose Acetate Phthalate (CAP) on Characteristics and Morphology of Polysulfone/Cellulose Acetate Phthalate (PSf/CAP) Blend Membranes A. Ali, R.M. Yunus, M. Awang, A. Johari and R. Mat	640

Analysis of Fiber Glass/Vinyl Ester Composite Subjected to Internal Pressure Loading for Compressed Natural Gas (CNG) Tube Type IV Application H. Ardhyanta, R.N. Baiti, M. Adi Afrianto and D. Kurniawan	645
Microstructure Study on Fe/Cr Based Alloys Added with Yttrium Oxide (Y₂O₃) Prepared via Ultrasonic Technique for Solid Oxide Fuel Cell (SOFC) Application D. Feriyanto, M.I. Idris, D. Sebayang, A. Bin Otman and P. Untoro	651
Microstructure and Magnetic Properties of Barium Hexaferrite Produced by Sol Gel Auto Combustion for Radar Absorber Material (RAM) Application Widyastuti, E. Kharismawati, M. Zainuri and H. Ardhyanta	656
The Influence of Carboxy Methyl Cellulose (CMC) and Solution pH on Carbon Fiber Dispersion in White Cement Matrix A.Y. Akbar, Y. Lestari, G. Ramadhan, S.A. Candra and E. Sugiarti	661
Effects of Heat Treatment and Titanium Nitride (TiN) Coating Deposited by Sputtering Technique PVD on Duylos 2510 Tool Steel Substrate V. Malau, S. Subagyo and Supriyanto	666
Experimental Study of Impact on Carbon-Fiber-Epoxy Composite Wing Leading Edge Structure N. Omar, Y. Aminanda and J.S. Mohamed Ali	672
Acoustic Emission Hit Generation Behavior of Basalt Fiber High Strength Mortar under Compression N.N. Kencanawati and M. Shigeishi	678
Application of Myrmecodia Pendans Extract as a Green Corrosion Inhibitor for Mild Steel in 3.5% NaCl Solution A. Pradityana, Sulistijono and A. Shahab	684
Al₂O₃ – SiO₂ Coating by Flame Spray for Thermal Barrier Coating Application Widyastuti, M. Lilis, S. Ridwan and M.A. Putrawan	691
Sintering of Stainless Steel Nanopowders for Micro-Component Part Applications S. Supriadi and E.R. Baek	697
Effect of Electron Beam Irradiation on Mechanical and Thermal Properties of Ethylene Vinyl Acetate/Polyamide 6/High Density Polyethylene Nanocomposite F. Hamid, S. Akhbar, K.H. Ku Hamid and A.R.M. Faizal	703
Effect of Tool Tilt Angle and Tool Plunge Depth on Mechanical Properties of Friction Stir Welded AA 5083 Joints N. Muhayat, A. Zubaydi, Sulistijono and M.Z. Yuliadi	709
Preliminary Study of Development of HDPE/EVA/MMT/EFB Nanohybrid Biocomposite by Using Single Screw Extruder M.S. Jainal, S.N. Che Kamarludin, S. Akhbar and A.R.M. Faizal	715
Effect of Intercritical Annealing Temperature and Holding Time on Microstructure and Mechanical Properties of Dual Phase Low Carbon Steel Alfirano, W. Samdan and H. Maulud	721
The Influence of High Content of Silicon in Austenitic Stainless Steel to Corrosion Rate in Sulphuric Acid F. Gapsari, S. Wahyudi and Sumawan	727
Optimization of Chemical Environment Condition towards Corrosion Rate of Sulfuric Acid Resistant Alloy Metal (Saramet) Using Response Surface Methodology S. Wahyudi, F. Gapsari and H. Awali	733
Effects of High Speed Tool Rotation in Micro Friction Stir Spot Welding of Aluminum A1100 A.S. Baskoro, Suwarsono, G. Kiswanto and W. Winarto	739
Slump Flow Modeling of Self-Compacting Concrete Using Smooth Support Vector Regression (SSVR) Y.S. Hadiwidodo and S.W. Purnami	743
Hydrophobic Silica Coating Based on Waterglass on Copper by Electrophoretic Deposition E. Setyowatia, S.F. Amalia, Nazriati, S. Affandi, M. Yuwanae and H. Setyawan	749
Comparison of AISI 316L Plasma Nitriding Behavior in Low and Medium Temperature Istiroyah, I.N.G. Wardana and D.J. Santjojo	755
Na₂SO₄ Induced Hot Corrosion of Aluminized Low Carbon Steel at 700 °C M. Badaruddin	761

Development and Evaluation of Nano Electret Filters for Household Water Treatment Y.C. Ahn, J.I. Cho, S.E. Kim, A.H. Jeong and G.T. Kim	767
Effect of Starter Defect to G_{IIC} of Unidirectional CFRP Composite F.M. Nor, H.Y. Lee, J.Y. Lim, M.N. Tamin and D. Kurniawan	773
Effect of Heat Treatment on Microstructure Homogeneity of Zn-3Mg Alloy M.S. Dambatta, S. Izman, H. Hermawan and D. Kurniawan	777