

**2006 IEEE Vehicle Power and
Propulsion Conference**

6 - 8 September 2006

Windsor, United Kingdom

TABLE OF CONTENTS

Analysis of the Double-Tiered Three-Battery Switched Capacitor Battery Balancing System	1
<i>Andrew Baughman, Mehdi Ferdowsi</i>	
The research of induction motor driving system for hybrid electric vehicle.	7
<i>Song Liwei, Zheng Wei, Zhu Chunbo, Liu Weiliang, Cheng Shukang</i>	
Experimental Characterisation of a Super-capacitor Based Electrical Torque Boost System for Down-sized ICE Vehicles.	11
<i>J. Wang, B. Taylor, Z. Sun, D. Howe</i>	
Sub-Harmonic Problem in Multi-Converter Vehicular Power Systems.	17
<i>Amir M. Rahimi, Alireza Khaligh, Ali Emadi</i>	
Noise Reduction Control Strategies for Switched Reluctance Drives.	22
<i>Knut A. Kasper, Jens O. Fiedler, Daniel Schmitz, Rik W. De Doncker</i>	
Global Optimisation in the power management of a Fuel Cell Hybrid Vehicle (FCHV)	28
<i>J. Bernard, S. Delprat, F. Buechi, T.M. Guerra</i>	
Optimization Series HEV Drive Using Modelling and Simulation Methods	34
<i>Antoni Szumanowski, Arkadiusz Hajduga</i>	
A Modular Power and Energy Management Structure for Dual-Energy Source Electric Vehicles	40
<i>L.Rosario, P.C.K.Luk, J.T.Economou, B.A. White</i>	
Inverse Dynamic Simulation of Non-Quadratic MIMO Powertrain Models -Application to Hybrid Vehicles	46
<i>Anders Fröberg</i>	
Logitudinal and lateral control for automatic vehicle following	52
<i>P.F. Toulotte, S. Delprat, T.M. Guerra</i>	
Dymola for Multi-Engineering Modelling and Simulation	58
<i>Mike Dempsey</i>	
Hybrid Petri Nets in Conceptual Schema of Dual-Motor Vehicle Synchronization	64
<i>R. Letchmanan, J.T. Economou, A. Tsourdos, B.A. White</i>	
High Temperature Operation at 225°C of a Half Bridge Module using GaN HFETs	70
<i>Takehiko Nomura, Sonomi Ishii, Mitsuru Masuda, Seikoh Yoshida, Tsutomu Yamate, Yukio Sudo, Jiro Takeda</i>	
Effect of Hub Motor Mass on Stability and Comfort of Electric Vehicles	75
<i>D.J. van Schalkwyk, M.J. Kamper</i>	
Education as part of the Swedish “Green Car” R&D Program	81
<i>Sture Eriksson, Mats Alaküla</i>	
A Novel Structure for Comprehensive HEV Powertrain Modelling	85
<i>Alan Walker, Andy McGordon, Geoff Hannis, Alex Picarelli, Johnathan Breddy, Steve Carter, Adrian Vinsome, Paul Jennings</i>	
A Study of Energy Management System of Electric Vehicles.	90
<i>N. Jinrui, S. Fengchun, R. Qinglian</i>	
Hybridized Electric Energy Storage Systems for Hybrid Electric Vehicles	96
<i>David Hoelscher, Alex Skorcz, Yimin Gao, Mehrdad Ehsani</i>	
Global Optimal Design of a Wheel Traction Motor by a Systemic Approach of the Electric Drive Train.	102
<i>Victor Mester, Frédéric Gillon, Stéphane Brisset, Pascal Brochet</i>	
Performance of a Series Hybrid Electric Vehicle with a Free-Piston Energy Converter.	108
<i>Jörgen Hansson, Mats Leksell</i>	
On the Characterization of Ultracapacitor Banks Used for HEVs	114
<i>M. I. Marei, S. J. Samborsky, S. B. Lambert, M. M. A. Salama</i>	
Fuzzy Logic Control of a Fuel Cell/Ultra-capacitor Hybrid Vehicular Power System.	120
<i>M. C. Kisacikoglu, M. Uzunoglu, M. S. Alam</i>	
Switched Causal Modeling of Transmission with Clutch in Hybrid Electric Vehicles.	125
<i>W. Lhomme, R. Trigui, P. Delarue, B. Jeanneret, A. Bouscayrol, F. Badin</i>	
Model validation of the whole traction system of an automatic subway.	131
<i>J. N. Verhille, A. Bouscayrol, P. J. Barre, J. P. Hautier</i>	
Energy optimisation of hybrid-electric vehicles, The Pisa Experience	137
<i>M. Ceraolo, A. di Donato, G. Franceschi</i>	
VPP Education in Universities: the Pisa experience	143
<i>M. Ceraolo, L. Taponecco, P. Terreni</i>	
Simulation and Analysis of Performance of a Pure Electric Vehicle with a Super-capacitor	148
<i>N. Jinrui, W. Zhifu, R. Qinglian</i>	

Evaluation of the New Sensorless Approach in Energy Storage Charge Balancing	154
<i>Andrew Baughman, Mehdi Ferdowsi</i>	
Comparative Investigation of Series and Parallel Hybrid Electric Drive Trains for Heavy-Duty Transit Bus Applications	159
<i>Sheldon S. Williamson, Sanjaka G. Wirasingha, Ali Emadi</i>	
Pulse Adjustment, a Novel Digital Control Technique, for Control of a DC-DC Buck-Boost Converter Operating in Discontinuous Conduction Mode and Driving Constant Power Loads	169
<i>Alireza Khaligh, Ali Emadi</i>	
Sensitivity Analyses of Pulse Adjustment Control Technique of a Buck-Boost Converter Operating in Discontinuous Conduction Mode and Driving Constant Power Loads	174
<i>Alireza Khaligh, Amir M. Rahimi, Mohammadreza Khaligh, Ali Emadi</i>	
Power Management of an Ultracapacitor/Battery Hybrid Energy Storage System in an HEV	179
<i>Srdjan M. Lukic, Sanjaka G. Wirasingha, Fernando Rodriguez, Jian Cao, Ali Emadi</i>	
Optimal Adaptive Solution to Powersplit Problem in Vehicles with Integrated Starter/Generator	185
<i>J.T.B.A. Kessels, M.W.T. Koot, P.P.J. van den Bosch</i>	
Parameter Estimation Selection for a Sensorless Railway Traction application	191
<i>Iban Vicente, Joseba Arza, Martin Brown, Alasdair Renfrew</i>	
Automotive Electrical Actuation Technologies	197
<i>D. Iles-Klumpner, I.Serban, M. Ristic</i>	
PMSM Drive Systems for Electric Active Steering (EAFS) Application: a Comparative Characterization.	203
<i>D. Iles-Klumpner, I.Serban, M. Ristic</i>	
New Double Input DC-DC Converters for Automotive Applications	209
<i>Krishna P. Yalamanchili, Mehdi Ferdowsi, Keith Corzine</i>	
Hybrid Excitation Synchronous Machines: Energy Efficient Solution for Vehicle Propulsion	215
<i>Y. Amara, L. Vido, M. Gabsi, E. Hoang, M. Lécrivain, F. Chabot</i>	
Fuel Cell Drive Train Systems – Driving Cycle Evaluation of Potential Topologies	221
<i>S.M. Naylor, V. Pickert, D.J. Atkinson</i>	
Optimal Multilevel Hierarchical Control Strategy for Parallel Hybrid Electric Vehicle	227
<i>Miaohua Huang, Houyu Yu</i>	
Design and Analysis of IMCCR Used in Electric Vehicle.	231
<i>Cao Junci, Li Weili, Xie Ying, Cui Shumei</i>	
Electromagnetic Field and Thermal Field Analysis and Simulation of an Induction Motor on Asymmetrical Operation Used in Electric Vehicles	235
<i>Xie Ying, Li Weili, Li Shoufa, Cui Shumei</i>	
The Development of an Electric Bus with Super-Capacitors as Unique Energy Storage	241
<i>Chunbo Zhu, Rengui Lu, Likun Tian, Qi Wang</i>	
A Basic Study of Electrical Variable Transmission and Its Application in Hybrid Electric Vehicle.	246
<i>Shumei Cui, Yuan Cheng, C.C. Chan</i>	
Control Strategy for Double Shaft Parallel Hybrid Electric Vehicle	250
<i>Cui Shumei, Zheng Wei, Tian Likun</i>	
Rotor Slots Design of Induction Machine for Hybrid Electric Vehicle Drives	254
<i>Cui Shumei, Dai Ying, Song Liwei</i>	
Study of Bidirectional DC-DC Converter for Power Management in Electric Bus with Supercapacitors	257
<i>Kong Zhiguo, Zhu Chunbo, Yang Shiyang, Cheng Shukang</i>	
A Robust Nonlinear Control Approach for the Traction Problem in Electrical Vehicles	262
<i>Kai Zheng, Tielong Sheny, Yu Yao</i>	
Effect of Magnetic Field Diffusion on the Time Response of Current Viewing Transformers.	267
<i>William Sommerville, James Gover</i>	
Development and Implementation of a Control System for a Parallel Hybrid Powertrain	270
<i>Jimmy C. Mathews, Kennabec J. Walp, G. Marshall Molen</i>	
Modelling and Simulating Dynamic Vehicle with Component Hybrid Dynamic Nets.	276
<i>Aiman Nouh, Mouhcine Chami, Abdesslem Djerdir, Mohammed El Bagdouri</i>	
Design and Characterisation of a Fuel Cell-Battery Powered Hybrid System for Vehicle Applications	282
<i>N.P. Brandon, P. Aguiar, D.J.L. Brett, R.N. Bull, I. Coop, R.C. Galloway, G.W.G. Hayes, K. Lillie, C. Mellors, M. Millward, A.R. Tilley</i>	
Modeling and Decoupling Control of ICE APU with Uncontrolled Rectifier in Series Hybrid Vehicle	288
<i>Shuo Tian, Guijun Cao, Qiang Han, Jianqiu Li, Minggao Yang</i>	
Ultracapacitor Enabled Gatekeeper Energy Management Strategy for Single Mode eCVT Hybrid Vehicle Propulsion.	294
<i>John M. Miller, Michael Everett, Juergen Auer</i>	

Modular 3-Phase Permanent Magnet Brushless Machines for In-Wheel Applications	300
<i>J. Wáng, K. Atallah, Z.Q. Zhu, D. Howe</i>	
A Fuzzy Based Safe Power Management Algorithm for Energy Storage Systems in Electric Vehicles	306
<i>V. Galdi, A. Piccolo, P. Siano</i>	
HEV (Hybrid Electric Vehicles) and the Wiring Reduction Methods	312
<i>Dr. S.A. Mirtaheri, Sajjad Salimpour</i>	
Modeling for simulation of hybrid drivetrain components	317
<i>T. Hofman, M. Steinbuch, R.M. van Druten</i>	
Modeling and Simulation of Hybrid drive trains with a friendly Man Machine Interface	323
<i>M. Ceraolo, A. di Donato</i>	
Decision of the CEV Infrastructure Priority Order Using Genetic Algorithm	329
<i>Fumiko Koyanagi, Yūdai Aida, Tadashi Kon, Ryuichi Yōkoyama</i>	
Prediction and Detection of Jackknifing Problems for Tractor Semi-Trailer	335
<i>M. Bouteldja, A. Koita, V. Dolcemascolo, J. C. Cadiou</i>	
Design of multi-stack axial flux permanent magnet generator for a hybrid electric vehicle	341
<i>Peethamparan Anpalahan, Michael Lampert</i>	
Analysis of High Speed Characteristics for Linear Induction Machines.	345
<i>H. Yú, R. Jayabalan, M. Krishnamurthy, B. Fahimi</i>	
Spacecraft Power Subsystem Technology Selection	351
<i>Samina Asif, Yún Li</i>	
Hybrid Electric Vehicle Modeling and Analysis in Generic Modeling Environment	357
<i>Wénzhong Gao, Shravana Musunuri</i>	
Modeling and Analysis of Hybrid Fuel Cell Systems for Vehicular Applications	363
<i>A. Abedini, A. Nasiri</i>	
Impact of Boost Converter Switching Frequency on Optimal Operation of Fuel Cell Systems.	369
<i>S. Wáng, Y. Kenarangui, B. Fahimi</i>	
On the impact of fuel cell system response on power electronics converter design	374
<i>Y. Kenarangui, S. Wáng, B. Fahimi</i>	
A Novel Battery Charger for Automotive Applications.	380
<i>Z. Vrankovic, A. Nasiri</i>	
A New Soft-Switched Bidirectional DC–DC Converter Topology for Automotive High Voltage DC Bus Architectures	386
<i>Tomokazu Mishima, Eiji Hiraki, Toshihiko Tanaka, Mutsuo Nakaoka</i>	
Progress in the Development of Lead-Acid Batteries for Hybrid Electric Vehicles	392
<i>Allan Cooper, Patrick Moseley</i>	
Actuator Model Uncertainty with Bounded Responses.	398
<i>J.T. Economou, G. Logie, I.A. Ashokaraj, A.Tsourdos, B.A.White</i>	
The Comparison and Choice of Several Power Factor Correction Methods.	403
<i>Wú Kuiyuan</i>	
A New Method to Realize ZVS-PWM in Full Load Range (A)	408
<i>Mr. Wú Kuiyuan</i>	
A New Method to Realize ZVS-PWM in Full Load Range (B)	414
<i>Wú Kuiyuan</i>	
Calculation of Transient Current Distribution in Compulsator Wires of Electromagnetic Launchers and Railguns	420
<i>Karthik Sheshadri</i>	
Optimizing the Hybridization Factor for a Parallel Hybrid Electric Small Car	425
<i>Courtney Holder, James Gover</i>	
Hybrid Switched Reluctance Integrated Starter and Generator	430
<i>Zhang Qianfan, Chai Feng, Cheng Shukang, C.C.Chan</i>	
Analysis and Operational Characteristics of a Reduced Parts Converter for Bipolar Excitation of SR Drives	435
<i>Chris S. Edrington, Billy Yancey, Justin Powell, Alton Tounsand, Gerry Mohlke</i>	
Impact of Improved Cost Function-Based Torque Split Algorithm on Different Drive Train Topologies	441
<i>Markus Stiegeler, Michael Sauter, Jochen Lindenmaier, Herbert Kabza</i>	
A Novel In-wheel Switched Reluctance Motor	446
<i>P.C.K. Luk, P. Jinupun</i>	
Application of Dual Mechanical Port Machine in Hybrid Electrical Vehicles	451
<i>Yuan Zhang, Longya Xu</i>	

Fault Evaluation of Relative-Coupled BLDC Drives for Multi-Facet Mobile Robot with Distributed Speed Factors.	456
<i>R. Letchmanan, J.T. Economou, A. Tsourdos, I.A. Ashokaraj, B.A. White</i>	
Development of High-efficiency 42V Cooling Fan Motor for Hybrid Electric Vehicle Applications	462
<i>Jin Hur, Byoung-Kuk Lee, Chung-Yuen Won, Baek-Heang Lee</i>	
Design of a network-based traction control system considering temporal behaviors	468
<i>Minsuk Shin, Jaehyun Han, Jeamyounng Youn, Myoungcho Sunwoo</i>	
Development of High-efficiency 42V Cooling Fan Motor for Hybrid Electric Vehicle Applications	474
<i>Jin Hur, Ha-Gyeong Sung, Byoung-Kuk Lee, Chung-Yuen Won, Baek-Heang Lee</i>	
A Study on Hybrid Energy Storage System for 42V Automotive Power-net	480
<i>Baek-Haeng Lee, Dong-Hyun Shin, Byeong-Woo Kim, Hee-Jun Kim, Byoung-Kuk Lee, Chung-Yuen Won, Jin Hur</i>	
Water Transport Experiment of the PEFC based on a Generic Experimental Method	485
<i>Suk-Won Choi, Keonyup Chu, Junghwan Ryu, Myoungcho Sunwoo</i>	
Object oriented modeling of an Interior Permanent Magnet Synchronous Motor Drives for Dynamic Simulation of Vehicular Propulsion.	491
<i>Wootaik Lee, Jung-Pyo Hong</i>	
Control of Output Voltage of Simple DC-DC Converters	497
<i>Afshin Pashaei, M.T.Haque, Sara Alizadeh</i>	
System Modeling and Simulation as a Tool for Developing a Vision for Future Hybrid Electric Vehicle Drivetrain Configurations.	502
<i>Dennis Doerffel, Suleiman Abu Sharkh</i>	
Optimization of Compressor Power Supply and Control Systems for Automotive Fuel Cell Drive Train Applications	508
<i>S.M. Naylor, V. Pickert, D.J. Atkinson</i>	
Direct-Drive Electromechanical Linear Actuator for Shift-by-Wire Control of an Automated Transmission	513
<i>Andrew Turner, Keith Ramsay, Richard Clark, David Howe</i>	
Comparison of DC-DC Converter Interfaces for Fuel Cells in Electric Vehicle Applications	519
<i>A. Lachichi, N. Schofield</i>	
FlexRay–MilCAN Bridging	525
<i>D. Summers, Dr P. Charchalakis, Dr E. Stipidis, Dr F.H. Ali</i>	
What Lessons Can Controller Area Networks Learn From FlexRay.	529
<i>F. Sethna, Dr E. Stipidis, Dr F.H. Ali</i>	
Requirements for a Revolution in Automotive Technology	533
<i>Thomas A. Keim</i>	
Modelling of a PEFC system and compressor control strategy	539
<i>Pascal Schott, Jean-Philippe Poirot-Crouvezier</i>	
Simplified electrical model tuned for actual controlled PEMFC.	542
<i>W. Hankache, S. Caux, D. Hissel, M. Fadel</i>	
Design of a High Power, High Step-Up Non-isolated DC-DC Converter for Fuel Cell applications.	548
<i>B. Huang, I. Sadli, J.-P. Martin, B. Davat</i>	
PEMFC system efficiency optimisation through model based control strategies	554
<i>Felix Grasser, Alfred C. Rufer</i>	