## **2007 IEEE Vehicle Power and Propulsion Conference**

Arlington, TX 9-12 September 2007

Pages 1-431



**IEEE Catalog Number: ISBN 13:** 

CFP07VPP-PRT 978-0-7803-9760-6

## **TABLE OF CONTENTS**

## Monday, September 10, 1:30PM-5:30PM

Plenary P	aper	
	Battery Management for Maximum Performance in Plug-In Electric and Hybrid Vehicles Philip T. Krein	2
Vehicular	Electric Power Systems, Chair: Dr. Ali Emadi, Room: World Series - I	
1:30PM	A Multi-Agent Based Power Sharing Scheme for Hybrid Power Sources Zhenhua Jiang	7
1:50PM	Trip Based Power Management of Plug-in Hybrid Electric Vehicle with Two-Scale Dynamic Programming Qiuming Gong, Yaoyu Li and Zhong-Ren Peng	12
2:10PM	A Novel Power Shaping Stabilising Control Strategy for DC Power Systems with Constant Power Lo Jiabin Wang	
2:30PM	Analysis and Control of a 3-phase PWM Inverter Supplied by Unbalanced Split-Source DC Voltage Novica Losic	Bus 26
2:50PM	Realization of Parasitics in the Stability of Dc-Dc Converters Loaded by Constant-Power Loads in Discontinuous Conduction Mode	21
	Alireza Khaligh, Patrick Chapman, Ali Davoudi and Juri Jatskevich	31
3:10PM	Energy Management in Hybrid Vehicles Considering Thermal Interactions Christian Haupt, Dominik Bucherl, Armin Engstle, Hans-Georg Herzog and Georg Wachtmeister	36
Vehicular	Applications of Fuel Cells, Chair: Dr. Sheldon Williamson, Room: Triple Crown Room	
1:30PM	A Low-Cost Battery-Less Power Train for Small Fuel Cell Vehicle Applications Frank Bryan, Daniel Nuttall, Andrew Forsyth, Yonghua Cheng and Joeri Van Mierlo	43
1:50PM	Uninterruptible Power Supplies for Fuel-Cell-Vehicles Farshad Harirchi and Farhad Harirchi	50
2:10PM	Performance Characterization and Comparison of Power Control Strategies for Fuel Cell Based Hybrid Electric Vehicles Di Wu and Sheldon Williamson	55
2:30PM	Power Distribution Control for a Fuel Cell Hybrid Electric Bus Hongwen He, Chengning Zhang and Xiaojiang Yu	62
2:50PM	Effect of DC-DC Converters on Direct Etanol Fuel Cells Output Florian Misoc, Medhat Morcos, James Lookadoo, Junxiao Wu and Richard Colgren	66
Motor Dri	ves for vehicular applications, Chair: Dr. Alain Bouscayrol, Room: Wimbledon Room	
1:30PM	Space Vector Current Controller for Three-Phase Induction Motor Drives Oleg Vodyakho and Taehyung Kim	72
1:50PM	Adaptive Control of Servo Motor by MRAC Method M. S. Ehsani	78
2:10PM	Investigation of Electromechanical Differences of Linear Induction Machine Operation Regions Haidong Yu and Babak Fahimi	84
2:30PM	State Space Modeling and Simulation of Sensorless Control of BLDC Motors Using Instantaneous Rotor Position Tracking Adal Nasiri and Salahaddin Zahalawi	00
2.50DX	Adel Nasiri and Salaheddin Zabalawi	90
2:50PM	Back-EMF Based Detection of Stator Winding Inter-turn Fault for PM Synchronous Motor Drives Thierry Boileau, Babak Nahid-Mobarakeh and Farid Meibody-Tabar	95

	ession: Thermal management in Venicular Power Electronics, Chair: Dr. Chris Mi, iperbowl - I	
1:30PM	A Unique Approach to Power Electronics and Motor Cooling in a Hybrid Electric Vehicle Environments Ayers, James Conklin, John Hsu and Kirk Lowe	onment 102
1:50PM		
	Applications Chris Mi, Li Ben Q., Buck Derrick and Ota Naoki	107
2:10PM	Design and Simulation of An Inverter-fed Induction Motor for Electric Vehicles Liu Huijuan, Zhang Yihuang, Zheng Qionglin, Wang Dong and Guo Shizhou	112
2:30PM	A Comparison of Hybrid Electric Vehicle Power Electronics Cooling Options Michael O'Keefe and Kevin Bennion	116
2:50PM	Comparing Microchannel Technologies to Minimize the Thermal Stack and Improve Thermal Performance in Hybrid Electric Vehicles	
	Nicholas Jankowski, Lauren Everhart, Brian Morgan, Bruce Geil and Patrick McCluskey	124
	ession: Fault tolerant electric drive for vehicular applications, Chair: Dr. Leila Parsa uperbowl - II	a,
1:30PM	Simultaneous Simulation of PM Machine Drive Using the Physics-Based Phase Variable Model of Hardware-in-the-Loop Simulation Approach	
1:50PM	Osama Mohammed, Shuo Liu and Nagy Abed  On-board Fault Diagnosis of HEV Induction Motor Drive at Start-up and During Idle Mode  Bilal Akin, Salih Baris Ozturk and Hamid A. Toliyat	132 140
2:10PM	·	148
2:30PM	Space Vector Current Control of a Brushless PM Machine for Electric Vehicles Oleg Vodyakho and Taehyung Kim	154
2:50PM	A Novel Multiphase Fault Tolerant Permanent Magnet Motor Drive for Fuel cell Powered Vehic Mehdi Abolhassani	les 160
Tuesda	y, September 11, 8:00AM-12:00PM	
Permane	nt Magnet Motor Drives, Chair: Dr. Mehdi Abolhassani, Room: World Series - I	
8:00AM	An Enhanced Field Reconstruction Method for Design of Permanent Magnet Synchronous Mach Brad Deken, Steven Pekarek and Babek Fahimi	ines 169
8:20AM	A Lookup Table Based Loss Minimizing Control for FCEV Permanent Magnet Synchronous Mot Junggi Lee, Kwanghee Nam, Seoho Choi and Soonwoo Kwon	ors 175
8:40AM	A Novel Digital Control Method of PMSM for Automotive Applications Adel Nasiri and Damoun Ahmadi	180
9:00AM	Motor	ıs 185
9:20AM	Sonia Rebouh, Azeddine Kaddouri, Rachid Abdessemed and Abdelhakim Haddoun  Input admittance characteristics of permanent-magnet brushless AC motor drive systems  Jiabin Wang	191
<b>Automoti</b>	ve Power Electronics, Chair: Dr. Alireza Khaligh, Room: Triple Crown Room	
8:00AM		culated
3.007 HIL	PWM	
0.2043.5	Omar Mansouri, Mohannad Khair Allah, Kamal Meghriche and Abderrezzak Cherifi	198
8:20AM	Cascaded H-bridge Multilevel Inverters - A Reexamination Jingsheng Liao, Kai Wan and Mehdi Ferdowsi	203

8:40AM	A 5 kW Bi-directional Multilevel Modular DC-DC Converter (MMCCC) Featuring Built in Power Management for Fuel Cell and Hybrid Electric Automobiles Faisal Khan and Leon Tolbert	208
9:00AM	Integrated Bi-Directional AC/DC and DC/DC Converter for Plug-in Hybrid Electric Vehicle Conversion  Young Log Log and Ali Empli	215
9:20AM	Young-Joo Lee and Ali Emadi  Large Area Silicon Carbide Vertical Junction Field Effect Transistors for High Temperature Powe  Conditioning Applications	r
	Victor Veliadis, Ty McNutt, Megan McCoy, Harold Hearne and Paul Potyraj	223
Design, N Room	lodeling and Analysis of actuator systems, Chair: Dr. Mehdi Ferdowsi, Room: Wimble	edon
8:00AM	A Design and Research of Induction Electrical Variable Transmission Shumei Cui, Wenxiang Huang, Yuan Cheng, Kewang Ning and C.C. Chan	231
8:20AM	Design of a Brushless Rotor Supply for a Wound Rotor Synchronous Machine for Integrated Starte Generator Jerome Legranger, Guy Friedrich, Stephane Vivier and Jean Claude Mipo	r 236
8:40AM		230
	Kevin Rosenbaum, Steve Pekarek and Tommy Baudendistel	242
9:00AM	Design and Evaluation of a 42 V Automotive Alternator with Integrated Switched-Mode Rectifier Sai Chun Tang, David Otten, Thomas Keim and David Perreault	250
9:20AM	SDTC Neural Network Traction Control of an Electric Vehicle without Differential Gears Abdelhakim Haddoun, Farid Khoucha, Mohamed El Hachemi Benbouzid, Demba Diallo and Rach Abdessemed	id 259
9:40AM	Direct-Drive Rotary-Linear Electromechanical Actuation System for Control of Gearshifts in Automated Automotive Transmissions	
	Andrew Turner, Keith Ramsay, Jonathan Wheals, Richard Clark and David Howe	267
	ession: Modeling for simulation of propulsion systems, Chair: Dr. John Kessels Dr. A ol, Room: Superbowl - I	Main
8:00AM	Physical Model for Investigation of Diesel Engine Cranking by Belt-driven Integrated Starter Generator	
0.0017.5	Aditya Dhand, Daniel Kok, Don Kees, Bo Gao and Alan Walker	274
8:20AM	A generic Battery Model for Dynamic Simulation of Hybrid Electric Vehicle Olivier Tremblay, Louis-A Dessaint and Abdel-Illah Dekkiche	284
	Energetic Macroscopic Representation of a fuel cell-supercapacitor system  Loic Boulon, Marie-Cecile Pera, Daniel Hissel, Alain Bouscayrol and Philippe Delarue	290
9:00AM	Three-dimentional Energetic Dynamic Model of the Tire-Soil Interaction Roberto Zanasi, Federica Grossi and Riccardo Moeselli	298
9:20AM	Influence of Control Design on Energetic Performance of an Electric Vehicle Keyu Chen, Philippe Delarue, Alain Bouscayrol and Rochdi Trigui	306
9:40AM	HEVs Comparison and components sizing using dynamic programming Emmanuel Vinot, Rochdi Trigui, Bruno Jeanneret, Julien Scordia and Francois Badin	314
	ession: Advanced Energy Storage Systems, Chair: Prof. Patrick Chapman, perbowl - II	
8:00AM	Increased Performance of Battery Packs by Active Equalization Jonathan Kimball, Brian Kuhn and Philip Krein	323
8:20AM	Ultracapacitor Energy Management and Controller Developments for a Series-Parallel 2-by-2 Hyd Electric Vehicle Jared Hicks, Robert Gruich, Alex Oldja, Dustin Myers, Tom Hartley, Robert Veillette and Iqbal Hu	

8:40AM	Electro Energy Bipolar Wafer Cell Battery Technology for PHEV Applications John Dailey, K.M. Abraham, Robert Plivelich, James Landi and Martin Klein	336
9:00AM	Prevention of Thermal Runaway Propagation in a Li-ionn Battery Pack Riza Kizilel, Rami Sabbah, Peter Sveum, Jan Selman and Said Al-Hallaj	344
9:20AM	Stability Criteria for the Energy Storage Bi-directional Dc/Dc Converter in the Toyota Hybrid Syst Alireza Khaligh	em II 348
Tuesday	/, September 11, 1:30PM-5:30PM	
Advanced	d Motor Drives for Vehicular Applications, Chair: Dr. B. K. Lee, Room: Triple Crown R	oom
1:30PM	A PWM Strategy with Reduced Bearing Currents for Five-Phase Motors Isaac S. Freitas, Hamid A. Toliyat, Cursino B. Jacobina and Salih Baris Ozturk	354
1:50PM	Hybrid Switched Reluctance Motor Applied in Electric Vehicles Qianfan Zhang, Shumei Cui and Xinjia Tian	359
2:10PM	Design and Analysis of a 5-phase DSRM Drive Chris Edrington and Steven Minor	364
2:30PM	Short-circuit Fault Mitigation in Six-phase Induction Machine Drive Reginaldo Miranda, Hamid Toliyat, Cursino Jacobina and Antonio Marcus Lima	370
2:50PM	Effects of Airgap Length Variation in Frictionless Linear Induction Transportation Systems Haidong Yu and Babak Fahimi	377
Hybrid Ve	ehicles - 1, Chair: Dr. John Economou, Room: Wimbledon Room	
1:30PM	Design and Control Principles of Hybrid Braking System for EV, HEV and FCV Yimin Gao, Liang Chu and Mehrdad Ehsani	384
1:50PM	Conductive CM and DM Noise Analysis of Power Electronic Converters in Electric and Hybrid Ele Vehicles	
2:10PM	Adel Nasiri and YounHee Lee  A Novel High Efficiency High Power Interleaved Coupled-Inductor Boost DC-DC Converter for Hyand Fuel Cell Electric Vehicle  Suman Dwari and Leila Parsa	392 <i>ybrid</i> 399
2:30PM	High Efficient Intelligent Motor Control for a Hybrid Shunting Locomotive Behzad Asaei and Maisam Amiri	405
2:50PM	Performance Investigation and Comparison of Two Different Electrical Hybrid System Structures Alireza Payman, Serge Pierfederici and Farid Meibody-Tabar	412
Special S	ession: Hardware-in-the-loop simulation, Chair: Dr. Rochdi Trigui, Room: Superbowl	- I
1:30PM	Component and Subsystem Evaluation in a System Context using Hardware in the Loop Neeraj Shidore, Henning Lohse-busch, Ryan Smith, Ted Bohn and Philip Sharer	419
1:50PM	Validation of Mechanical Transmission with Clutch using Hardware In the Loop Simulation Walter Lhomme, Rochdi Trigui, Alain Bouscayrol, Philippe Delarue and Bruno Jeanneret	425
2:10PM	Modern Hardware-In-the-Loop Simulation Technology for Fuel Cell Hybrid Electric Vehicles Christian Dufour, Tetsuhiro Ishikawa, Abourida Simon and Belanger Jean	432
2:30PM	Validation of Anti-Slip Control for Traction System Using Hardware In the Loop Simulation J. N. Verhille, Alain Bouscayrol, P. J. Barre and Jean-Paul Hautier	440
2:50PM	Hardware In the Loop Simulation of a Diesel Parallel Mild-Hybrid Electric Vehicle Rochdi Trigui, Bruno Jeanneret, Bertrand Malaquin, François Badin and Cedric Plasse	448
Special S	ession: Plug-in Hybrid Electric Vehicles, Chair: Dr. Ali Emadi, Room: Superbowl - Il	
1:30PM	Plug-in Hybrid Vehicles - A Vision for the Future Mehdi Ferdowsi	457

1:50PM	Analysis and Design of Vehicular Power Systems Using PSCAD/EMTDC Shaahin Filizadeh, Adam Chevrefiles and Daniel Northcott	463
2:10PM	Plug-in Hybrid Electric Vehicles: Testing, Simulations, and Analysis Ji Wu, Ali Emadi, Michael Duoba and Theodore Bohn	469
2:30PM	Efficiency and Loss Models for Key Electronic Components of Hybrid and Plug-in Hybrid Electric Vehicles' Electrical Propulsion Systems Jian Cao, Desikan Bharathan and Ali Emadi	477
2:50PM	Plug-In Hybrid Market Transformation by Leveraging a Niche Market: School Buses Sadia Sadiq, Ewan Pritchard, Ken Dulaney and Ali Emadi	483
3:10PM	IIT Plug-in Conversion Project with the City of Chicago Peter Sveum, Riza Kizilel, Mohammed Khader and Said Al-Hallaj	493
Hybrid Ve	ehicles - 2, Chair: Dr. Sheldon Williamson, Room: Yacht Club Room	
1:30PM	Comparative Investigation of Series and Parallel Hybrid Electric Vehicle (HEV) Efficiencies Based Comprehensive Parametric Analysis Xin Li and Sheldon Williamson	<i>l on</i> 499
1:50PM	Modeling and Validation of a Hydrogen Engine Powered Hybrid Electric Vehicle Xiaolai He, Timothy Maxwell and Micheal Parten	506
2:10PM	The Design and Development of a Through-the-Road Parallel Diesel Electric Hybrid Matthew Young, G. Marshall Molen, David Oglesby, Kyle Crawford, Kennabec Walp, Ron Lewis, Christopher Whitt and Stephen Phillips	511
2:30PM	Four-leg based Matrix Converter with Fault Resilient Structures and Controls for Electric Vehicle of Propulsion Systems Sangshin Kwak, Taehyung Kim and Oleg Vodyakho	<i>and</i> 519
2:50PM	Advanced Current Sensing Techniques for Power Electronic Converters Ashaben Patel and Mehdi Ferdowsi	524
3:10PM	Research of an Energy-FED Induction Motor Driving Test Platform with Double Inverters for HEV Song Liwei, Li Zijian, Zhang Qianfan, Fu Jianfu and Wang Fuping	531
Wednes	day, September 12, 8:00AM-12:00PM	
Energy S	torage Components, Chair: Dr. Daniel Hissel, Room: World Series - I	
8:00AM	Charging Supercapacitors from Low Voltage with an Induction Machine Lu Jiang and Beat Arnet	537
8:20AM	Modelling and testing of a turbo-generator system for exhaust gas energy recovery Melanie Michon, Stuart Calverley, Richard Clark, David Howe and James Chambers	544
8:40AM	Test Characterisation of a H2 PEM Fuel Cell Heng Yap and Nigel Schofield	551
9:00AM	Electrical and Thermal Performance of the Carbon-carbon Ultracapacitor Under Constant Power Conditions John Miller	559
9:20AM	An Equivalent Circuit Model for Tractive Super-Capacitor Chun-bo Zhu	567
9:40AM	A Novel Algorithm for Designing PID Controllers for High-Speed Flywheels Salman Talebi, Behrooz Nikbakhtian and Hamid Toliyat	574
Power Ma	anagement for Automotive Applications, Chair: Dr. Chris Edrington, Room: Triple Cro	wn
8:00AM	Electronic Horizon: Energy Management using Telematics Information  I.T.B.A. Kessels and P.P.I. Bosch, van den	581

8:20AM	Phase-shift Controlled Multilevel Bidirectional DC/DC Converter: A Novel Solution to Battery Cha Equalization in Fuel Cell Vehicle Wei Jiang and Babak Fahimi	irge 587
8:40AM	Fuzzy Logic Control of a Fuel Cell/Battery/Ultra-capacitor Hybrid Vehicular Power System Mithat Kisacikoglu, Mehmet Uzunoglu and Mohammad Alam	591
9:00AM	Intelligent Energy Management in a Vehicle with Integrated Starter Alternator Behzad Asaei, Shahrokh Farhangi and Alireza Fayazi	597
9:20AM	Power Management Strategies for a Fuel Cell/ Supercapacitor Electric Vehicle Francisco J. Perez-Pinal, Ciro Nunez, Ricardo Alvarez and Ilse Cervantes	605
9:40AM	Usage Pattern Development for Three-Wheel Auto Rickshaw Taxis in India Srdjan Lukic, Priscilla Mulhall, Gilsu Choi, Mustafa Naviwala, Sairam Nimmagadda and Ali Emad	i 610
Dynamic	Analysis of vehicular components, Chair: Dr. Rochdi Trigui, Room: Wimbledon Room	1
8:00AM	Development of a Test Bench for Tuning and Validating Electric Power Steering Control Method Chih-Jung Yeh, Shih-Rung Ho, Ming-Chih Lin, Tsung-Hsien Hu and Tsung-Hua Hsu	618
8:20AM	Modeling, Simulation and Evaluation of a Cooler Model in Modelica using Dymola Dragan Simic, Anton Haumer, Thomas Baeuml and Franz Pirker	623
8:40AM	Comparative Analysis of Control Techniques for Efficiency Improvement in Electric Vehicles Abdelhakim Haddoun, Mohamed El Hachemi Benbouzid, Demba Diallo, Rachid Abdessemed and Jamal Ghouili	629
9:00AM	Modeling of Non-Salient PM Synchronous Machines under Stator Winding Inter-turn Fault Conditi Dynamic Model - FEM Model Babak Vaseghi, Babak Nahid-Mobarakeh, Noureddine Takorabet and Farid Meiboy-Tabar	ion: 635
9:20AM	Study on the Dynamic Characteristics of Pneumatic ABS Solenoid Valve for Commercial Vehicle Liang Chu, Yanli Hou, Minghui Liu, Jun Li and Yimin Gao	641
Wednes	day, September 12, 8:00AM-9:00AM	
Special S	ession: Advances in Automotive Electronics, Chair: Dr. B. K. Lee, Room: Superbowl -	· II
8:00AM	Cell Balancing Circuit Implementation with DC/DC Converters Using Super Capacitor Equivalent Circuit Parameters	
8:20AM	Jaehoon Jang, Junghyun Nam and Jiyoon Yoo  Control of Personal Rapid Transit System and Configuration of an Apparatus to Evaluate its Control Scheme	646 ol
	Jun-Ho Lee and Kyung-Ho Shin	654
8:40AM	Analysis and Design of a Regenerative Energy Conversion System Based on an Active Simulator Byoung Kuk Lee, Su Jin Jang, Han Min Lee and Gil Dong Kim	659
9:00AM	Range Assessment between Vehicle and Wayside Radio Set for Radio Communication System Rag-Gyo Jeong, Young-Ki Yoon and Gie-Soo Park	665
Wednes	day, September 12, 10:30AM-12:00PM	
Special S	ession: Automotive Education and Research, Chair: Dr. Ali Emadi, Room: Superbowl	- II
10:30AM	Formula Hybrid Racing at Illinois Institute of Technology: Design to Implementation Sanjaka Wirasingha, Jonathan Sibley, Antonis Antoniou, Anthony Castaneda and Ali Emadi	670
10:50AM	An Integrated Starter-Alternator System Using Induction Machine Winding Reconfiguration Gregory Martin, Richard Moutoux, Maung Myat, Richard Tan, Geoff Sanders and Frank Barnes	677
11:10AM	Entrepreneurial Projects Program at Illinois Institute of Technology: Solar/Battery Hybrid Three-Wheel Auto Rickshaw for India Priscilla Mulhall, Mustafa Naviwala, Srdjan Lukic, James Braband and Ali Emadi	682

## Wednesday, September 12, 1:30PM-5:30PM

Modeling	and Simulation of Vehicular Systems, Chair: Dr. Adel Nasiri, Room: Triple Crown Ro	om
1:30PM	Development of Air-ABS-HIL-Simulation Test Bench	
	Liang Chu, Youlin Huang, Minghui Liu, Jun Li and Yimin Gao	691
1:50PM	Electric Vehicle Control using the Simulator ELEVES (paper number (7064), registration number Aiman Nouh, Mouhcine Chami, Abdesslem Djerdir and Mohammed El Bagdouri	(53)) 696
2:10PM	Development of an Interactive Lane Keeping Control System for Vehicle Jing-Fu Liu, Jui-Hung Wu and Yi-Feng Sue	702
2:30PM	Thermal Analysis of Hybrid Multilevel Megawatt AC Drives with ETO Devices Zhong Du, Alex Huang, Burak Ozpineci and Leon Tolbert	707
2:50PM	Transient Motion Characteristics When Electric Vehicles with the Structure Driven by Front and R Wheels Independently Fail Mutoh Nobuyoshi and Takahashi Yusuke	Rear 712
3:10PM	Air-fuel ratio control for an IC engine Jimmy Lauber, Djamel Khiar and Thierry-Marie Guerra	712
	and Simulation for Automotive Electronics, Chair: Dr. Sheldon Williamson,	
1:30PM	Low-Order Dynamic Magnetic Equivalent Circuits of Saturated Steel Laminations Ali Davoudi, Alireza Khaligh, Marco Amrhein, Patrick Chapman and Juri Jatskevich	725
1:50PM	Thermal Modelling of Enclosed Cables in Automotive Applications Johann Grandvuillemin, Didier Chamagne, Raynal Glises, Christophe Tiraby and Fabienne Butel Degrange	730
2:10PM	An Advanced Simulation Tool Based on Physical Modelling of Electric Drives in Automotive Applications Thomas Baeuml, Harald Giuliani, Dragan Simic and Franz Pirker	736
2:30PM	An Intelligent Rule-Based System for Fault Detection and Diagnosis on a Model-Based Actuator D George Kladis, John Economou, Antonios Tsourdos and Brian White	
2:50PM	Transient Simulation of an AC Synchronous Permanent Magnet Motor Drive for an All-Electric Al Terrain Vehicle	
2.1000.6	Adam Chevrefils and Shaahin Filizadeh	748
3:10PM	Preliminary Design, Simulation and Modeling of a Series Hybrid Commuter Vehicle with a Minima Engine Ligin Ni Doop Potterson and Jorge Hydring	ai 10 754
	Liqin Ni, Dean Patterson and Jerry Hudgins	134
Vehicular	Power Systems and Loads, Chair: Dr. Fernando Rodriguez, Room: Superbowl - I	
1:30PM	Research on the Low-frequency Mechanical Characteristics of MR Damper in Ship Isolator Xiongliang Yao, Zhengdong Tian, Zhihua Shen and Lili Song	760
1:50PM	Research on the Mechanics Characteristics of Ship Vibration Reduction and Impact Resistance Iso Based on MR Xiongliang Yao, Zhengdong Tian, Zhongchao Deng and Zhihua Shen	olator 765
2:10PM	Electric Differential for Traction Applications Francisco J. Perez-Pinal, Ciro Nunez, Ricardo Alvarez, Ilse Cervantes and Ali Emadi	771
	ession: Electromechanical actuators for Vehicular Applications, Chair: Dr. Jin Hur, iperbowl - I	
	Characteristic Analysis and Comparison of IPMSM for HEV According to Pole and Slot Combinat  [Jae-Woo Jung Jung-Pyo Hong and Young-Kyoun Kim]	tion 778

1:50PM	Investigation on Characteristics and Optimal Shapes of Interior PM Synchronous Motor for Electr Vehicle Application	ric
	Sung-Il Kim, Jung-Pyo Hong and Jin Hur	784
2:10PM	Development of an Electric Driven Pump Unit for Electro-Hydraulic Power Steering of 42V Autom Se-hyun Rhyu, Yong-kyoun Kim, Jun-hyuk Choi, Jin Hur and Doo-hyung Lee	obile 791
2:30PM	The Dynamic Control of Hybrid Energy Storage System for Mild HEV Baek Haeng Lee, Dong Hyun Shin, Hyun Sik Song, Jin Beom Jeong, Hee Jun Kim and Byeong We Kim	oo 796
2:50PM	The Development of Hybrid Electric Compressor Motor Drive System for HEV Tae-UK Jung, Sung-Ho Lee, Sung-Il Kim, Sung-Jun Park and Jung-Pyo Hong	802
3:10PM	Optimality and Reachability - Pseudo Boolean Power FLows for Multi-Sources Vehicle Topologies George Kladis, John Economou, Antonios Tsourdos and Brian White	s 808
<b>V</b> ednes	sday, September 12, 4:00PM-5:30PM	
Application	on-specific automotive developments, Chair: Mr. Igor Stamenkovic, Room: World Ser	ies -
Applicatio	Optimal Power Train Design of a Hybrid Refuse Collector Vehicle	
		815
4:00PM	Optimal Power Train Design of a Hybrid Refuse Collector Vehicle Tobias Knoke and Joachim Boecker Prime Mover and Energy Storage Considerations for a Hydrogen-Powered Series Hybrid Shuttle I	815 Bus
4:00PM 4:20PM	Optimal Power Train Design of a Hybrid Refuse Collector Vehicle Tobias Knoke and Joachim Boecker Prime Mover and Energy Storage Considerations for a Hydrogen-Powered Series Hybrid Shuttle H Mark Flynn, Clay Hearn, Michael Lewis, Richard Thompson and Raul Longoria Low Cost Flywheel Energy Storage for a Fuel Cell Powered Transit Bus	815 Bus 821
4:00PM 4:20PM 4:40PM	Optimal Power Train Design of a Hybrid Refuse Collector Vehicle Tobias Knoke and Joachim Boecker Prime Mover and Energy Storage Considerations for a Hydrogen-Powered Series Hybrid Shuttle II Mark Flynn, Clay Hearn, Michael Lewis, Richard Thompson and Raul Longoria Low Cost Flywheel Energy Storage for a Fuel Cell Powered Transit Bus Clay Hearn, Mark Flynn, Michael Lewis, Richard Thompson, Brian Murphy and Raul Longoria Soft Switch High Conversion Ratio DC-DC Converter for an Electrical Bicycle Bart Meersman, Steven Thielemans, Alex Van den Bossche and Koen De Gusseme Design and Simulation of a Fuel Cell Hybrid Powered Motorcycle and Comparison with Non-Hybric System	815 Bus 821 829 837
4:00PM 4:20PM 4:40PM 5:00PM	Optimal Power Train Design of a Hybrid Refuse Collector Vehicle Tobias Knoke and Joachim Boecker Prime Mover and Energy Storage Considerations for a Hydrogen-Powered Series Hybrid Shuttle II Mark Flynn, Clay Hearn, Michael Lewis, Richard Thompson and Raul Longoria Low Cost Flywheel Energy Storage for a Fuel Cell Powered Transit Bus Clay Hearn, Mark Flynn, Michael Lewis, Richard Thompson, Brian Murphy and Raul Longoria Soft Switch High Conversion Ratio DC-DC Converter for an Electrical Bicycle Bart Meersman, Steven Thielemans, Alex Van den Bossche and Koen De Gusseme Design and Simulation of a Fuel Cell Hybrid Powered Motorcycle and Comparison with Non-Hybrid	815 Bus 821 829