

LDIA2003

The 4th International Symposium on
**LINEAR DRIVES FOR INDUSTRY
 APPLICATIONS**
 8-10 September 2003, Birmingham, UK
FINAL PROGRAMME

		Kingston Theatre	Telford Room	Lodge Rooms 1&2, Faraday Room
Monday 8th September	12:30	Registration (Atrium)		
	14:30 – 14:40	WELCOME ADDRESS		
	14:40 – 15:40	INVITED PAPERS I SP-01, SP-02		
	15:40 – 16:00	Break - Lounge Bar		
	16:00 – 17:40	INDUSTRIAL APPLICATIONS IN-01 → IN-05	TRANSVERSE FLUX & RELUCTANCE MACHINES I TR-01 → TR-05	
	18:00 – 20:00	Welcome Reception - Lounge Bar		
Tuesday 9th September	09:00 – 11:00	LINEAR INDUCTION MACHINES I LI-01 → LI-06	PLANAR MACHINES I PL-01 → PL-06	
	11:00 – 11:20	Break - Lounge Bar		
	11:20 – 13:00	CONTROL I CO-01 → CO-05	AUTOMOTIVE APPLICATIONS I AU-01 → AU-03, AU-06 → AU-07	
	13:00 – 13:40	Lunch - Lounge Bar		
	13:40 – 15:20	MAGNETIC LEVITATION & SUSPENSION I ML-01 → ML-05	MANUFACTURING MA-01 → MA-05	
	15:20 – 15:30	Break - Lounge Bar		
	15:30 – 17:30		POSTER SESSION A TRANSPORTATION II TP-07→TP-10 MAGNETIC LEVITATION & SUSPENSION II ML-06→ML-16 LINEAR INDUCTION MACHINES II LI-07→LI-13 ELEVATORS EL-01→EL-03 CONTROL II CO-06→CO-23	
	19:30	Symposium Dinner - Birmingham Museum and Art Gallery		
Wednesday 10th September	09:00 – 10:00	INVITED PAPERS II SP-03, SP-04		
	10:00 – 10:20	Break - Lounge Bar		
	10:20 – 12:20		POSTER SESSION B PM MACHINES II PM-07→PM-11 TF & RELUCTANCE MACHINES II TR-06→TR-12 PLANAR MACHINES II PL-07→PL-09 NOVEL MACHINES II NO-01→NO-06 MODELLING/ANALYSIS RELATED TOPICS MO-01→MO-12 AUTOMOTIVE APP. II MI-01→MI-16 AU-04→AU-05	
	12:20 – 13:20	Lunch - Lounge Bar		
	13:20 – 15:20	TRANSPORTATION I TP-01 → TP-06	PERMANENT MAGNET MACHINES I PM-01 → PM-06	
	15:20 – 15:40	Break - Lounge Bar		
	15:40 – 16:00	CLOSING REMARKS		

Monday 8th September 2003

14:30 – 14:40	WELCOME ADDRESS Kingston Theatre 14:30 – 14:40 <i>Professor David Howe, University of Sheffield, UK</i>	
14:40 – 15:40	INVITED PAPERS I Kingston Theatre	
	SP-01 Direct Linear Drives: Market and Performance Status A. Cassat, Ecole Polytechnique Fédérale de Lausanne, Switzerland; N. Corsi, N. Wavre, ETEL SA; R. Moser, SSM AG. SP-02 Status of Linear Drives in Japan Teruo Azukizawa, Kobe University of Mercantile Marine, Japan	
15:40 – 16:00	Coffee Break - Lounge Bar	
16:00 – 17:40	INDUSTRIAL APPLICATIONS Kingston Theatre	TRANSVERSE FLUX & RELUCTANCE MACHINES I Telford Room
	IN-01 New Developments for a Linear Motor System with Multiple Carriers Bernd Sieber, Juergen Breil, Brueckner Maschinenbau GmbH, Germany IN-02 Development of a High-Speed Electromagnetic Repulsion Mechanism for High-Voltage Vacuum Circuit Breakers Mitsuru Tsukima, Toshie Takeuchi, Kenichi Koyama, Mitsubishi Electric Corporation, Japan IN-03 Low Speed Linear Electrical Generators for Renewable Energy Applications M.A. Mueller, N.J. Baker, P.R.M. Brooking, J Xiang, University of Durham IN-04 Design and Construction of a Flat Linear Induction Motor to Drive a Robot for Steel Ships Inspection Rui Jardim and A. Leão Rodrigues, New University of Lisbon, Portugal IN-05 Energy Saving Hydraulic Displacement Controlled Linear Actuators in Industry Applications and Mobile Machine Systems Robert Rahmfeld, Monika Ivantysynova, Technical University of Hamburg-Harburg, Germany	TR-01 Performance Evaluation of a TF Linear PM Motor M. Andriollo, Polytechnic of Milan, Italy; G. Martinelli, A. Morini, A. Tortella, M. Zerbetto, University of Padova, Italy TR-02 Object-Oriented Model for Inductance Computation of a Linear SRM S.J. Watkins, J. Corda, The University of Leeds, UK TR-03 Development of High-Field Transverse Flux Induction Drive for Ordnance Handling on Navy Ships and Industrial Conveyors Stephen Kuznetsov, Allen Levien, Autumn Wyda, Power Superconductor Applications Corp., USA TR-04 A New Linear Switched Reluctance Actuator: Performance Analysis M. R. A. Calado, C. M. P. Cabrita, University of Beira Interior, Portugal TR-05 Performance of a Linear Reluctance Motor with Novel Structure Kokichi Ogawa, Oita University, Japan
18:00 – 20:00	Welcome Reception - Lounge Bar	

Tuesday 9th September 2003

09:00 – 11:00	LINEAR INDUCTION MACHINES I Kingston Theatre	PLANAR MACHINES I Telford Room
	<p>LI-01 Analysis of Thrust Ripple in Linear Induction Motor Tatsumi Utsumi, Hiroshi Watanabe, Isao Yamaguchi, Department of Electrical and Electric Engineering, Tokai University, Japan</p> <p>LI-02 Evaluation Study of Velocity Characteristics of Linear Induction Motors Yasuo Yamaguchi, Naoki Maki, Tokai University, Japan</p> <p>LI-03 Push-type Suspending Conveyer Driven by Linear Induction Motor Yunyue Ye, Chengzhi Fan, Qinfen Lu, Huifen Lu, Zhejiang University, P.R.China</p> <p>LI-04 Characteristics of Two Types of End Effect Compensators for Linear Induction Motor N. Fujii, T. Hoshi, Y. Tanabe, Kyushu University, Japan</p> <p>LI-05 The Evolution of Advanced Induction Motors to Advanced Linear Induction Motors Eric Lewis, Graham Bellamy, ALSTOM Power Conversion, UK; Jeff Proverbs, Force Engineering, UK</p> <p>LI-06 Linear Induction Motor Variable Frequency Standstill Tests to Predict Operational Velocity Performance J. F. Eastham, P. C. Coles, EnigmaTec Ltd, UK; M. Benarous, Goodrich Ltd, UK; J. Proverbs, A Foster, Force Engineering Ltd, UK</p>	<p>PL-01 Development of X-Y-θ Alignment Stage Driven by Linear Surface DC Motor Masaru Shirai, Junichi Onozaki, Atsushi Hiratsuka, Tadashi Kimura, Yoshio Kano, Tamura Corporation, Japan</p> <p>PL-02 A Proposal of the Servo-Driven High Speed Surface Motor Akimasa Otsuka, Masaya Watada, Susumu Torii, Daiki Ebihara, Musashi Institute of Technology, Tokyo, Japan; Yasuaki Aoyama, Ken Ohashi, Shin-Etsu Chemical Co.Ltd, Japan</p> <p>PL-03 Design Tool for a 6-DOF Planar Motor with Moving Permanent Magnets and Standstill Coils J.W. Jansen, E.A. Lomonova, A.J.A. Vandenput, J.C. Compter, Eindhoven University of Technology, The Netherlands</p> <p>PL-04 Two-dimensional Linear Drive Combined with Electromagnetic Levitation for a Flexible Transportation Line T. Koseki, Y. Makino, J. Liu, The University of Tokyo, Japan; S. Inui, Y. Ohira, Nihon University, Japan</p> <p>PL-05 Characteristic of the Two-dimensional Oscillatory Actuator with the Attractive Force of Driving Source Susumu Torii, Hiroki Nakano, Toshihiro Yamaguchi, Daiki Ebihara, Musashi Institute of Technology, Tokyo, Japan; Yuya Hasegawa, Katsuhiko Hirata, Matsushita Electric Works, Ltd, Japan</p> <p>PL-06 Electromagnetic Characteristics of a Coreless Surface Motor Using Halbach Permanent Magnets Hiroyuki Ohsaki, Naoyuki Teramura, Huang Xueliang, Yuichi Tsuboi, Yosuke Ootani, The University of Tokyo, Japan</p>
11:00 – 11:20	Coffee Break - Lounge Bar	
11:20 – 13:00	CONTROL I Kingston Theatre	AUTOMOTIVE APPLICATIONS I Telford Room
	<p>CO-01 Speed Control Method of LSynRM with Magnetic Suspension using Armature Winding for Propulsion Masayuki Sanada, Shigeo Morimoto, Yoji Takeda, Osaka Prefecture University, Japan</p> <p>CO-02 Constant Load Angle Control of the Discontinuous Primary Linear Synchronous Motor without Position Feedback Yongjae Kim, Masaya Watada, Susumu Torii and Daiki Ebihara, Musashi Institute of Technology, Tokyo, Japan</p> <p>CO-03 Direct Torque Control of a Single-Sided Linear Induction Motor Based on Sliding Mode Bo Yang, Horst Grotstollen, University of Paderborn, Germany</p> <p>CO-04 Aiding Lift Force Control for Superconducting LSM Vehicle Tetsuzo Sakamoto, Kyushu Institute of Technology, Japan</p> <p>CO-05 Sensorless Position Control of Non Sinusoidal Flux Distribution Günter Oedl, Wolfgang Zintz, Brückner Maschinebau GmbH, Germany</p>	<p>AU-01 Application of a Free-Piston Generator in a Series Hybrid Vehicle A. Cosic, J. Lindbäck, W. M. Arshad, M. Leksell, P. Thelin, E. Nordlund, Royal Institute of Technology (KTH), Sweden</p> <p>AU-02 Permanent Magnet Actuators for Electromagnetic Valve in Automotive Applications Emmanuel Sedda, PSA Peugeot Citroën, France; Christophe Fageon, ITlink System, France; Jean-Paul Yonnet, Laboratoire d'Electrotechnique de Grenoble, France</p> <p>AU-03 A Novel Linear Actuator using a Low Cost BLDC Motor Didier J. Frachon, Antoine M. Foucaut, Moving Magnet Technologies, France</p> <p>AU-06 A Tubular Linear Actuator for Steer-By-Wire Applications N. Schofield, University of Sheffield, UK; A. Canova, Politecnico di Torino, Italy; M. Ottella, Centro Ricerche Fiat, Italy</p> <p>AU-07 Linear Reluctance Actuator for Variable-Geometry Turbocharger Jeffrey Carter, Holset Engineering Co Ltd, UK; Richard E. Clark, Geraint W. Jewell, University of Sheffield, UK</p>
13:00 – 13:40	Lunch - Lounge Bar	

13:40 – 15:20	MAGNETIC LEVITATION & SUSPENSION I Kingston Theatre	MANUFACTURING Telford Room
	<p>ML-01 Review of Tuned Circuit Levitators - New Perspectives B. Z. Kaplan, Ben-Gurion University of the Negev, Israel; G. Sarafian, Lahav Division Israel Aircraft Industries, Israel</p> <p>ML-02 Real-Time and Sensor-Less Magnetic Levitation Control using Finite Element Analysis Aska Tanaka, Susumu Torii, Musashi Institute of Technology, Tokyo, Japan</p> <p>ML-03 XLEV : A Novel Magnetic Levitation System for a Conveyor Vehicle Jan Van Goethem, Gerhard Henneberger, Aachen University of Technology, Germany</p> <p>ML-04 The Self-Gap-Detecting Electromagnetic Suspension System for Doors Mimpei Morishita, Hiroaki Itoh, Industrial and Power Systems & Services Company, Toshiba Corp., Japan</p> <p>ML-05 Electrodynamic Interaction between HT Superconducting Plate Short Secondary and Track with Permanent Magnets in Halbach Arrays: Experimental and Numerical Analyses Gino D'Ovidio, Giovanni Lanzara, University of L'Aquila, Italy; Francesco Crisi, Aurelio Navarra, Science and Technology Park of Abruzzo, Italy</p>	<p>MA-01 A Planar Motor with Electro-Dynamic Propulsion and Levitation under 6-DOF Control J.C. Compter, Philips, Centre for Industrial Technology, The Netherlands</p> <p>MA-02 Wire-Bonder Multiobjective Optimization Juraj Makarovic, Johan C. Compter, Elena A. Lomonova, Technical University of Eindhoven, The Netherlands</p> <p>MA-03 Design Analysis of a PM Motion System for Semiconductor Applications Yuan J. Liu, G P Widdowson, S.Y. Ho, ASM Assembly Automation Ltd , Hong Kong</p> <p>MA-04 Active Compensation Of Structural Oscillations of a 2D Laser Cutter's Cross-Arm using a Hybrid Propulsion Principle Guido Stoeppler, Siemens AG, Germany; Steve Douglas, John Moores University, Liverpool, UK</p> <p>MA-05 Analysis of the Influence of the Initial Pole Position on the PMLSM Thrust Performances – Application to High Speed Machine Tools Jia Zeng, Ghislain Remy, Pierre-Jean Barre, Philippe Degobert, Laboratoire d'Electrotechnique et d'Electronique de Puissance de Lille (L2EP), France.</p>
15:20-15:40	Coffee Break - Lounge Bar	
15:30 – 17:30	POSTER SESSION A Lodge Rooms 1 & 2, Faraday Room	
<p>TRANSPORTATION II</p> <p>TP-07 Study of a PWM Converter for a Linear Generator Controlling Zero-Phase Current Hitoshi Hasegawa, Yamanashi Maglev Test Centre, Japan; Toshiaki Murai, Takamitsu Yamamoto, Railway Technical Research Institute, Japan</p> <p>TP-08 Characteristics of Linear Induction Motor with Onboard Long Armature Core for Transit Nobuo Fujii, Kyushu University, Japan</p> <p>TP-10 Simulation and Implementation of a Curve Run of a Magnetic Levitated Transportation Vehicle Dirk Brakensiek, Jan Van Goethem, Gerhard Henneberger, Aachen University (RWTH Aachen), Germany</p> <p>MAGNETIC LEVITATION AND SUSPENSION II</p> <p>ML-06 High-Power Electrostatic Motor with the Function of Electrostatic Levitation Akio Yamamoto, Hidehiko Yasui, Naoshige Shimizu, Toshiro Higuchi, University of Tokyo, Japan</p> <p>ML-07 Characteristics of Attractive Force of Linear Induction Motor in a Novel Maglev System Driven by the Source Including High Frequency Component Toshimitsu Morizane, Katsunori Taniguchi, Noriyuki Kimura, Osaka Institute of Technology, Japan</p> <p>ML-08 Magnetic Vibration Simulator with Magnetic Levitation for EDS MAGLEV Toshiaki Murai, Hitoshi Hasegawa, Takayuki Kashiwagi, Railway Technical Research Institute, Japan</p> <p>ML-09 Dynamics of Fluxoid In Superconducting Thin Film arranged for Magnetic Suspension System based on Time Dependent Ginzburg-Landau Equation Takashi Hikihara and Shuichi Miyamoto, Kyoto University, Japan</p> <p>ML-10 Improvement of the Levitation Coil of the Experimental Device for the Sidewall Electrodynamic Suspension Shunsuke Ohashi, Yusuke Kimura, Kansai University, Japan</p> <p>ML-11 Non-contact Manipulation with Permanent Magnet Motion Control Koichi Oka, Kochi University of Technology, Japan</p> <p>ML-12 Electro-Magnetic Suspension System with Fuzzy Control for a Magnetically Levitated Railway System Shinichi Kusagawa., Katsuhiko Shutoh., Eisuke Masada, Tokyo University of Science, Japan; Jumpei Baba, University of Tokyo, Japan</p> <p>ML-13 Decoupled Control for the Hybrid-Magnets used in Maglev System with Large Air-Gap Liming Shi, Zhengguo Xu, Nengqiang Jin, Shangang Xu, Chinese Academy of Sciences, P.R. China</p>		

continued.

- ML-14 Repulsive Magnetic Bearing using the Motion Control of Permanent Magnets by Solenoids**
T. Mizuno, Y. Ishino and M. Takasaki, Saitama University, Japan
- ML-15 Additional Guidance Control for the Superconducting MAGLEV Vehicle using Lateral Force of LSM**
Akio Yamanaka, Jun-ichi Kitano, Central Japan Railway Company, Japan; Eiji Watanabe, Ken Watanabe, Hiroshi Yoshioka, Railway Technical Research Institute, Japan
- ML-16 Development of the Science Education Equipment with Magnetic Levitation Effect of HTSC**
Haruhiko Suzuki, Atsushi Ito, Fukushima National College of Technology, Japan; Masaaki Takashige, Iwaki Meisei University, Japan

LINEAR INDUCTION MACHINES II

- LI-07 Evaluation of Cell Reynolds Number Value Effects on Thrust Force of Linear Induction Motors with Non-Ferromagnetic Secondary**
Mehran Mirzayee, Mojtaba Mirsalim, Aryan Nicomanesh, Amirkabir University of Technology, Iran
- LI-08 Electrical Design of Cylindrical Linear Induction Motors Stressing Efficiency**
Akiyuki Hirano, Naoki Maki, Tokai University, Japan
- LI-12 Analysis of Linear Induction Motors using New Longitudinal End Effect Factors**
Carlos Manuel A. R. Cabral, University of Algarve, Portugal
- LI-13 Study on Experimental Evaluation for Equivalent Circuit Constants of Linear Induction Motors**
Masanao Kondoh, Naoki Maki, The Graduate school of Tokai University, Japan

ROPELESS ELEVATORS

- EL-01 Integration of Possible Motor Variants in Domestic Lifts without Rope**
S. Chevailler, A. Cassat, M. Jufer, Ecole Polytechnique Fédérale de Lausanne (EPFL) Switzerland; A. Dos Santos, REDE Eléctrica Nacional, SA, Portugal; R. Deplazes, Schindler SA, Switzerland
- EL-02 Dynamic Motion Control Scheme of Ropeless Elevator with Air-Cored Linear Synchronous Motor**
Tetsuzo Sakamoto, Kyushu Institute of Technology, Japan
- EL-03 Application of MPPT Control to the LSM for the Rope-Less Elevator**
Toshiaki Enomoto, Taisuke Tsukinaga, Masaya Watada, Susumu Torii, Daiki Ebihara, Musashi Institute of Technology, Tokyo, Japan

CONTROL II

- CO-06 Simultaneous Position and Levitation Control of Permanent Magnet Linear Synchronous Machines using Vector Control Techniques**
G. Martínez, A. García Rico, J. Flórez, Universidad de Navarra, Spain
- CO-07 Near-Time-Optimal Position Control of Linear Synchronous Motor Drives**
Stephen J. Dodds, University of East London, UK; Jan Vittek, University of Žilina, Slovakia
- CO-08 Control Strategies for Linear Induction Motors**
Miguel Martínez-Iturralde, Andrés García Rico, Julián Flórez, Universidad de Navarra, Spain
- CO-09 Nonlinear Feedback Control for Linear Induction Motor using a Speed Insensitive Sliding-Mode State Observer**
Piergiacomo Cancelliere, Vincenzo Delli Colli, Fabrizio Marignetti, University of Cassino, Italy
- CO-10 Sliding-Mode Speed Sensorless Control of Linear Induction Motor Drives**
Piergiacomo Cancelliere, Vincenzo Delli Colli, Fabrizio Marignetti, University of Cassino, Italy; Ion Boldea, University "Politehnica" of Timisoara, Romania
- CO-11 Analysis and Application of Two-Phase Space Vector Modulation to a Novel Tubular PM Motor**
V. Kremer, Z.Q. Zhu, D. Howe, University of Sheffield, UK
- CO-12 Optimal Control of Linear Induction Machines Taking into Account End-Effects**
Giuseppe Gentile, Santolo Meo, University of Naples "Federico II", Italy; Antonio Ometto, University of L'Aquila, Italy.
- CO-13 Direct Force Control of a Novel Two-Phase Tubular PM Motor**
V. Kremer, Z.Q. Zhu, D. Howe, University of Sheffield, UK
- CO-15 Control of an Elevator Drive with a Tubular Linear Induction Motor**
Yunyue Ye, Hongxing Jia, Jun Shi, Zhejiang University, P.R. China
- CO-17 Analysis of Linear Synchronous Reluctance Motor Tracking Control**
Drago Dolinar, Gorazd Štumberger, University of Maribor, Slovenia
- CO-18 Identification and Control of a Linear Servo System**
Jun-Xian Yang, Mi-Ching Tsai and Min-Fu Hsieh, National Cheng Kung University, Taiwan
- CO-20 Recurrent Fuzzy Neural Network Controlled Linear Induction Motor Servo Drive using Genetic Algorithms**
Faa-Jeng Lin, Po-Kai Huang, National Dong Hwa University, Taiwan
- CO-21 Flux Synthesis of a Linear Induction Motor for Compensating End-Effect based on Insight of a Control Engineer**
Takafumi Koseki, Ryo Mano, The University of Tokyo, Japan; Takeshi Mizuma, National Traffic Safety & Environment Laboratory (NTSEL), Japan
- CO-23 Comparison and Repeatability Characteristics of Genetically Tuned Current and Position Controllers on a Permanent-Magnet Linear Actuator**
Philip M. Churn, Philip H. Mellor, University of Bristol, UK; Christopher M. Bingham, David Howe, Geraint W. Jewell, Z. Q. Zhu, University of Sheffield, UK

19:30

Symposium Dinner - Birmingham Museum and Art Gallery

**09:00-
10:00**

INVITED PAPERS II
Kingston Theatre

SP-03 Status of Linear Motors in the United States
Jacek F. Gieras, United Technologies Research Centre, U.S.A.

SP-04 Research and Development of Linear Drive Technology in China
Yunyue Ye, Zhejiang University, P.R.China

**10:00 –
10:20**

Coffee Break - Lounge Bar

**10:20 –
12:20**

POSTER SESSION B
Lodge Rooms 1 & 2, Faraday Room;

PERMANENT MAGNET LINEAR MACHINES II

- PM-07 Design Characteristics of Steel-Cored Permanent Magnet Linear Synchronous Motor for Short Reciprocating Travel**
Ho-Yong Choi, Sang-Yong Jung, Sung-Mun Cho, Hyun-Kyo Jung, Seoul National University, Korea
- PM-08 Permanent Magnet Linear Actuators with Concentrated Coils**
Antonino Di Gerlando, Roberto Perini, Mario Ubaldini, Politecnico di Milano, Italy
- PM-09 Optimisation of the Secondary Design for a Modified Tubular Linear Synchronous Motor**
André W. van Zyl, Charles F. Landy, University of the Witwatersrand, Johannesburg, South Africa
- PM-10 Armature Reaction Field of Axially Magnetised, Iron-Cored Tubular Permanent Magnet Machines**
Jiabin Wang, David Howe, University of Sheffield, UK
- PM-11 Influence of Slot Openings in Tubular Modular Permanent Magnet Machines**
Masaya Inoue, Jiabin Wang, David Howe, University of Sheffield, UK

TRANSVERSE FLUX AND RELUCTANCE MACHINES II

- TR-06 Direct Work Control for a Linear Switched Reluctance Motor Drive**
Poramaste Jinupun, Patrick C. Luk, Cranfield University, UK
- TR-07 Transverse Flux Linear Motor Leading to a Tubular Configuration**
A. dos Santos, REDE Eléctrica Nacional, SA, Portugal; S. Chevailler, A. Cassat, Ecole Polytechnique Fédérale de Lausanne, Switzerland
- TR-08 Analysis of Transverse Flux Linear Induction Motor (TFLIM) Characteristics with Excitation Current Superimposing Third Harmonic Wave Ingredient**
Yuichiro Nozaki, Katsuhiko Shutoh, Eisuke Masada, Tokyo University of Science, Japan; Jumpei Baba, University of Tokyo, Japan
- TR-10 A Novel Configuration of Transverse Flux Hybrid Linear Stepper Motor**
M. Andriollo, T. Bertonecchi, Polytechnic of Milan, Italy
- TR-11 Investigating Manufacturing Defects in a Linear Transverse-Flux Machine for a Free-Piston Generator**
Waqas M. Arshad, Jens Lindbäck, Alija Cosic, Peter Thelin, Mats Leksell, Royal Institute of Technology (KTH), Sweden
- TR-12 A Novel Variable Reluctance Motor for Consumer Application**
G. Bellussi, A. Canova, M. Repetto, Politecnico di Torino, Italy

PLANAR MACHINES II

- PL-07 Static Analysis of an Electromagnetic Planar Actuator**
Aly F. Flores Filho, Altamiro A. Susin, Marilia A. da Silveira, Federal University of Rio Grande do Sul, Brazil; Dave Rodger, University of Bath, UK
- PL-08 A Study on the Moving Superconductor-Type Surface Motor**
Junichi Tsuchiya, Ohsuke Miura, Gunji Kimura, Tokyo Metropolitan University, Japan
- PL-09 Investigation of an X-Y Linear Induction Motor (X-Y LIM) Design Approach with Nonlinear Analysis**
H. Hanami, S. Shimizu, S. Inui, Y. Ohira, Nihon University, Japan

NOVEL MACHINES

- NO-01 Effects of Mover Yoke Materials on Linear Vibrator for Cellular Phone**
Haruo Ito, Katuhito Matuhiro, Teikoku Tsushin Kogyo Co.,Ltd, Japan; Masayuki Kodani, Hiroyuki Wakiwaka, Shinshu University, Japan
- NO-03 New Linear Synchronous Motor with Claw Pole Structured Mover**
Kenji Shiroshita, Kunihiko Iijima, Toshitaka Sakaki, Tamaga Seiki Co., Ltd., Japan; Kyouosuke Shimokawa, Hiroyuki Wakiwaka, Shinshu University, Japan

continued

- NO-04 Large Force Superconducting Linear Drive System Performance Analysis**
Ciwen Sha, Yan Peng, Jinfu Ling, Kuo Zhou, Yinming Dai, Yi Zheng, Aihuan Yang, Lingzhi Zhao, Ran Li, Chinese Academy of Sciences, P.R. China; Tianfu Yang and Tianli Yang, Harbin Tech-Full Industry Co., LTD, P.R. China
- NO-05 PM Type 3 Phase Stepping Motors and their Development to the Linear Stepping Motors**
Masafumi Sakamoto, Japan Servo Co Ltd. Japan; Akira Tozune, Ibaraki University, Japan
- NO-06 Concept and Analysis of an Innovating PM Rotary-Linear Brushless Motor**
P Bolognesi, University of Pisa, Italy

MODELLING AND ANALYSIS TECHNIQUES

- MO-01 Genetic Simulated Annealing Algorithm in Optimization Design of Cylindrical Linear Induction Motor**
Q F Lu, Y Chen, Y Y Ye, Zhejiang University, P.R. China
- MO-02 Magnetic Field Distribution in Tubular PM Motors with Axially Magnetised Magnets**
Z. P. Xia, Z. Q. Zhu, D. Howe, University of Sheffield, UK
- MO-03 A New Estimation of Linear DC Motor based on Motor Constant considering Iron Loss**
Tsutomu Mizuno, Kentaro Nishikawa, Makoto Utsono, Shinshu University, Japan; Manabu Kobayashi, Mitsubishi Electric Co.; Japan; Hajime Yamada, Doctoral International Collaboration Institute, Japan
- MO-04 Analysis of a Linear Induction Motor using Two-Dimensional Magnetic Equivalent Circuits (MEC)**
M. Mirzayee, M. Mirsalim, A. Nicomanesh, Amirkabir University of Technology, Iran
- MO-05 A Unified 2-D Analytical Method for Pm Linear Synchronous Motors**
Wang Xudong, Yuan Shiyong, Jiao Liucheng, Jiaozuo Institute of Technology, China; Wang Zhaoan, Xi'an Jiatong University, China; Z. Q. Zhu, D. Howe, University of Sheffield, Sheffield, UK.
- MO-06 3-Dimensional Analysis of a Permanent Magnet Linear Synchronous Motor using a Unified Analytical Method**
Wang Xudong, Yuan Shiyong, Jiao Liucheng, Jiaozuo Institute of Technology, China; Wang Zhaoan, Xi'an Jiatong University, China; Z. Q. Zhu, D. Howe, University of Sheffield, Sheffield, UK.
- MO-07 Dynamic Modelling of a Switched Linear Step Motor**
L. El Amraoui, B. Ben Salah, M. Benrejeb, Ecole Nationale d'Ingénieurs de Tunis, Tunisia;
F. Gillon, P. Brochet, L2EP - Ecole Centrale de Lille, France
- MO-08 Analytical and Numerical Investigation of PM Excited Linear Synchronous Machines with Shaped Magnets**
Wolf-Rüdiger Canders, Helmut Mosebach, Zhouying Shi, Technische Universität Braunschweig, Germany
- MO-09 Use of Advanced Scripting Language in the Modelling of Dynamic Systems**
Christopher P. Riley, Alexandros M. Michaelides, Vector Fields Ltd., UK.
- MO-10 Analysis of Salient-Pole Linear PM Motors using a Unified Analytical Method**
Shiyong Yuan, Xudong Wang, Liucheng Jiao, JiaoZuo Institute of Technology, China; Zhaoan Wang, Xi'an Jiatong University, China
- MO-11 Analytical Calculation of Air-Gap Field and Thrust Force in Tubular Moving-Magnet Actuators**
J. Kenneth Mitchell, Richard E. Clark, David Howe, University of Sheffield, UK
- MO-12 Magnetic Field Distribution of Quasi-Halbach Magnetised Tubular Permanent Magnet Machines**
Jiabing Wang, David Howe, Masaya Inoue, University of Sheffield, UK

RELATED TOPICS

- MI-01 Design of Self-Excited Linear Induction Generator**
B. Rezaee-Alam, Jawad Faiz, University of Tehran, Iran; P. Famouri, West Virginia University, USA
- MI-02 Analysis of the Long Stator Linear Synchronous Motor**
Juan Wang, Yaohua Li, Chinese Academy of Science, P.R. China
- MI-03 Linear Type Measuring Machine for Characteristic Evaluation of Leg**
Katsushi Furutani, Hiroshi Tachi, Mitsuru Saito, Toyota Technological Institute, Japan;
- MI-04 Unbalanced 3-Phase Equivalent Circuit of Linear Synchronous Motor**
Tatsumi Utsumi, Takashi Kawanami and Isao Yamaguchi, Tokai University, Japan
- MI-05 Inherent Progressive Smoothness of Linear Electrostatic Glass Motors**
Laurent Sache, Roland Moser, Alain Cassat, Hannes Bleuler, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland; Toshiro Higuchi, University of Tokyo, Japan
- MI-06 Output Voltage Simulations of Linear Variable Differential Transformer using Finite Element Method**
Y. Kikuchi, T. Kojima, T. Suganuma, K. Shiroshita, Tamagawa Seiki Co., Ltd., Japan; M. Nirei, Nagano National College of Technology, Japan; H. Wakiwaka, Shinshu University, Japan
- MI-07 Performance Improvement of a Linear Encoder by Multirate Sampling Observer**
Lilit Kovudhikulrungsri, Takafumi Koseki, University of Tokyo, Japan
- MI-08 Projection and Attraction of Aluminum Disc by Hybrid Electromagnetic Launcher**
Makoto Utsuno, Tsutomu Mizuno, Takeya Ikeda, Shinshu University, Japan; Hajime Yamada, Doctoral International Collaboration Institute, Japan
- MI-10 Rotational Decay of a Magnetically Levitated Spinning Top on a PM and a Bulk HTS**
M. Tsuchimoto, Hokkaido Institute of Technology, Japan; M. Tomita, M. Murakami, International Superconductivity Tech. Centre, Japan
- MI-11 The Effect of Electrical Time Constant to Motor Velocity of Interior Permanent Magnet Linear Synchronous Motor**
Norhisam Misron, Hiroyuki Wakiwaka, Kyosuke Shimokawa, Shinshu University, Japan; mHisashi Yajima, Nobuhiro Fujiwara, Susumu Takada, SMC Corporation, Japan
- MI-12 Characteristics of Saturated Linear Synchronous Reluctance Motor Determined Experimentally by the Controlled VSI**
Gorazd Štumberger, Drago Dolinar, Bojan Štumberger, University of Maribor, Slovenia

continued

	<p>MI-13 Sector Motor Thrust Characterisation via Artificial Neural Networks Luciana C. Leite, Carlos R. de Souza, University of Campinas, Brazil</p> <p>MI-14 Short Circuit Braking Principle of Linear Induction Motor with Double-Winding in the Case of Power Cut-Off Yuping Sun, Guangyou Li, Jin Zhang, Xiuzhen Wang, Shandong University, China</p> <p>MI-15 Design of Linear Induction Motor with Auxiliary Winding and Series Capacitors Yuping Sun, Guangyou Li, Jin Zhang, Qian Fang, Shandong University, China</p> <p>MI-16 An Electromechanical Friction Surfacing/Welding Machine D. Kinsey, D Howe, Z Q Zhu, University of Sheffield, UK; G.Blakemore, D.Gibson, Circle Technical Services Ltd. UK</p> <p>AUTOMOTIVE APPLICATIONS II</p> <p>AU-04 Influence of Speed and Current Profiles upon Converter Dimensioning and Electrical Machine Performance in a Free-Piston Generator Y. Liu, M. Leksell, W. M. Arshad, P. Thelin, KTH, the Royal Institute of Technology, Sweden</p> <p>AU-05 An Original Configuration of Linear Actuator with Parallel Polarization Stéphane Guerin, Emmanuel Sedda, PSA Peugeot Citroën, France; Christophe Fageon, ITlink System, France; Jean-Paul Yonnet, Christian Chillet, Lab d'Electrotechnique de Grenoble, France</p>	
12:20 – 13:20	Lunch - Lounge Bar	
13:20 – 15:20	TRANSPORTATION I Kingston Theatre	PERMANENT MAGNET MACHINES I Telford Room
	<p>TP-01 Force Generation and Magnetic Stray Flux of Linear DC Actuator for Electric Traction Applications B. Funieru, A. Binder, Th. Werle, Darmstadt University of Technology, Germany</p> <p>TP-02 Composition of Linear DC Motor for Magneto-hydrodynamic Thruster T Azukizawa, University of Mercantile Marine, Japan</p> <p>TP-03 General Atomics Urban Maglev Program Status Sam Gurol, Bob Baldi, General Atomics, USA</p> <p>TP-04 Numerical Simulation of Vehicle Dynamics of the Superconducting MAGLEV System using an Elastic Vehicle Model Hiroyuki Ohsaki, Yoshitomo Abe, The University of Tokyo, Japan</p> <p>TP-05 Power Supply and Propulsion System for Transrapid Commercial Lines Jürgen Nothhaft, Rolf Hellinger, Dirk Hoke, Markus Engel, Siemens AG, Germany</p> <p>TP-06 Magnetic Characteristics of Electromagnetic Levitation System using Electromagnet and Rail with Divided Iron Rail Takuro Mochizuki, Yorito Jifuku, Hitoshi Yamaguchi, Toshio Kakinoki, Takuma Nomiyama, Taiki Morikawa, Sojo University, Japan</p>	<p>PM-01 Design Optimisation of Slotless Linear PM Motors M. Andriollo, Polytechnic of Milan, Italy; G. Baccini, Baccini S.p.a., Italy; G. Martinelli, A. Morini, A. Tortella, University of Padova, Italy</p> <p>PM-02 Theoretic Investigation on Halbach Magnetized Linear Motors and Generators Sung-Mun Cho, Ho-Yong Choi, Sang-Yong Jung, and Hyun-Kyo Jung, Seoul National University</p> <p>PM-03 A Family of Modular Mono-Phase Linear Brushless Machines Paolo Bolognesi, University of Pisa, Italy</p> <p>PM-04 Development of a Low Cogging Force Permanent Magnet Linear Synchronous Motor K. Naka, M. Inoue, Advanced Technology R&D Centre, Mitsubishi Electric Corporation, Japan</p> <p>PM-05 Simplified Analytical Model for Predicting the Magnetic Field Distribution in Tubular PM Motors with Surface-Mounted Magnets Z. P. Xia, Z. Q. Zhu, D. Howe, University of Sheffield, UK</p> <p>PM-06 Force Ripple in Linear PM Motors: Causes and Remedial Strategies Nicola Bianchi, Silverio Bolognani, University of Padova, Italy</p>
15:20 – 15:40	Coffee Break - Lounge Bar	
15:40 – 16:00	<p>CLOSING REMARKS <i>Professor David Howe</i> Kingston Theatre</p>	