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# General information

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## General program overview

### Welcome reception

*Sunday July 3 / 17:00-19:00*

DAF Museum, Tongelresestraat 27, Eindhoven

The welcome reception will be held at the DAF museum in Eindhoven. The Museum is located in the center of Eindhoven at about a fifteen-minute walk from the Central Railway station. The city council has signposted the route to the Museum. A symposium registration desk is present at the welcome reception for attendees which have already registered in advance and for those who still need to register for the symposium.

The welcome reception in the DAF museum provides an opportunity to meet other attendees and to learn about the industrial history of Eindhoven. In the museum visitors can taste the inventiveness that has been characteristic for DAF vehicles from 1928 till the present day.

### Technical sessions

*Monday July 4 / 9:00 - Tuesday July 5 / 17:30*

Conference center Auditorium, Den Dolech 2, Eindhoven

Information about the Technical Sessions is found on page 15 and further.

### Banquet

*Monday July 4 / 18:30 - 22:30*

Laan Van Henkenshage 3, Sint-Oedenrode.

*Busses leave at the Symposium site (Auditorium) at 17:45 and will return here around 23:00.*

The banquet (walking dinner) is held at castle Henkenshage which is located in Sint-Oedenrode, N-Brabant. This beautiful castle, which is surrounded by water, has a wonderful bailey and garden and most probably dates from the 14th century. Although some of its wall still dates from 1450, quasi-medieval constructions built in 1850 dominate its looks.

## Technical tours

The technical tours are not included in the standard registration. Attendees should register separately through the website registration form, or by contacting [conferences@tue.nl](mailto:conferences@tue.nl). Both tours have a limited number of seats.

### Technical tour 1: Transport & Automation

*Wednesday July 6 / 8:45 - 13:30 / Vanderlande Industries*  
<http://www.vanderlande.com>

Vanderlande Industries is a market leader in automated material handling solutions. In market segments like Baggage Handling, Parcel Sorting and Automated Warehouses they deliver complete solutions. When 15 years ago they installed a complete baggage handling system based on carts driven by linear asynchronous drives they felt pioneers that had to develop crucial elements. Nowadays they deliver systems to major airports based on this technology and synchronous and asynchronous drives are applied in all their market segments in various applications.

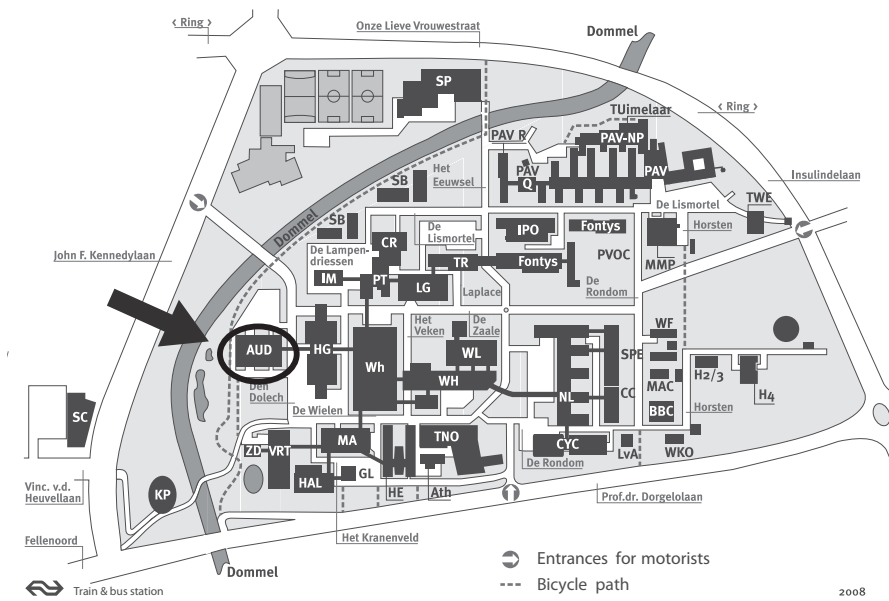
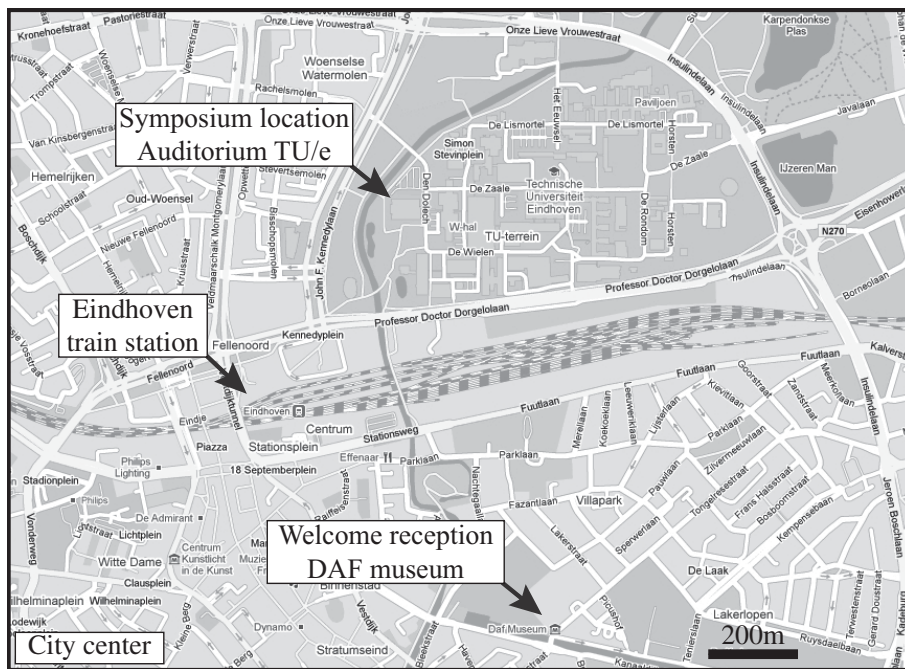
### Technical tour 2: High precision

*Wednesday July 6 / 8:45 - 15:30 / Assembléon (morning) and ASML (afternoon)*  
<http://www.assembleon.com>  
<http://www.asml.com>

Assembléon is a global supplier of Surface Mount Technology (SMT) Pick & Place solutions for the electronics manufacturing industry. Their customers include some of the leading players in industries such as consumer, personal computer and automotive electronics, as well as more specialized fields like module manufacturing and semiconductor backend. The advanced technologies which are used in Assembléon's products and the integration of both rotating and linear drives into their designs make a visit to this company highly interesting for all symposium attendees.

ASML is the world leading provider of lithography systems for the semiconductor industry, manufacturing complex machines that are critical to the production of integrated circuits or microchips. Headquartered in Veldhoven, the Netherlands, ASML designs, develops, integrates, markets and services these advanced systems, which continue to help our customers - the major chipmakers - reduce the size and increase the functionality of microchips, and consumer electronic equipment.

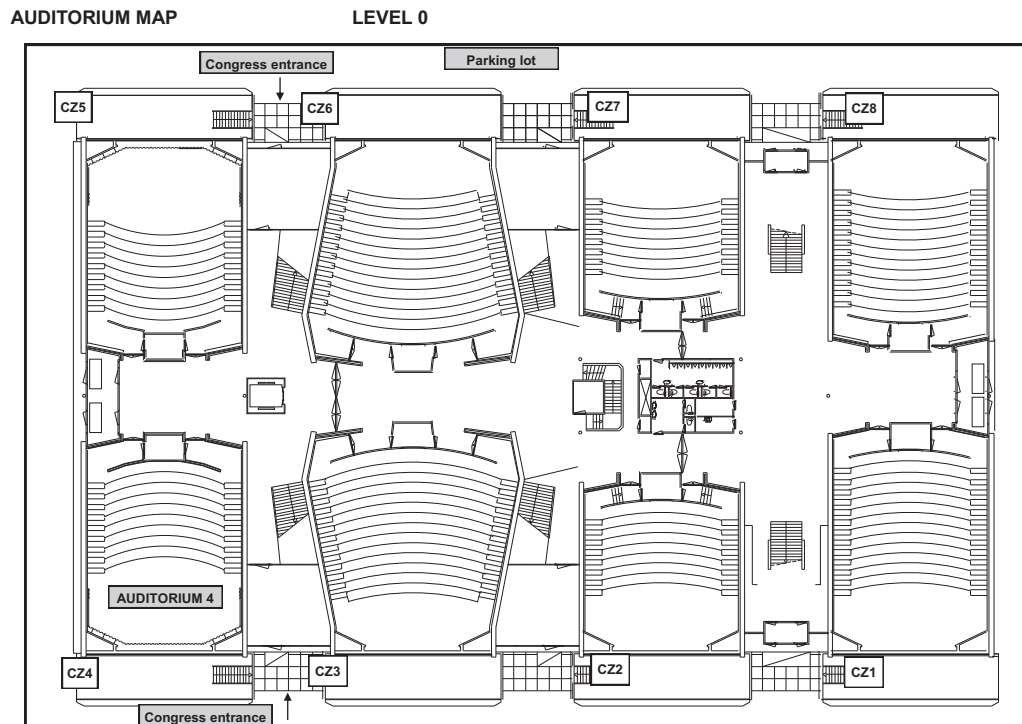
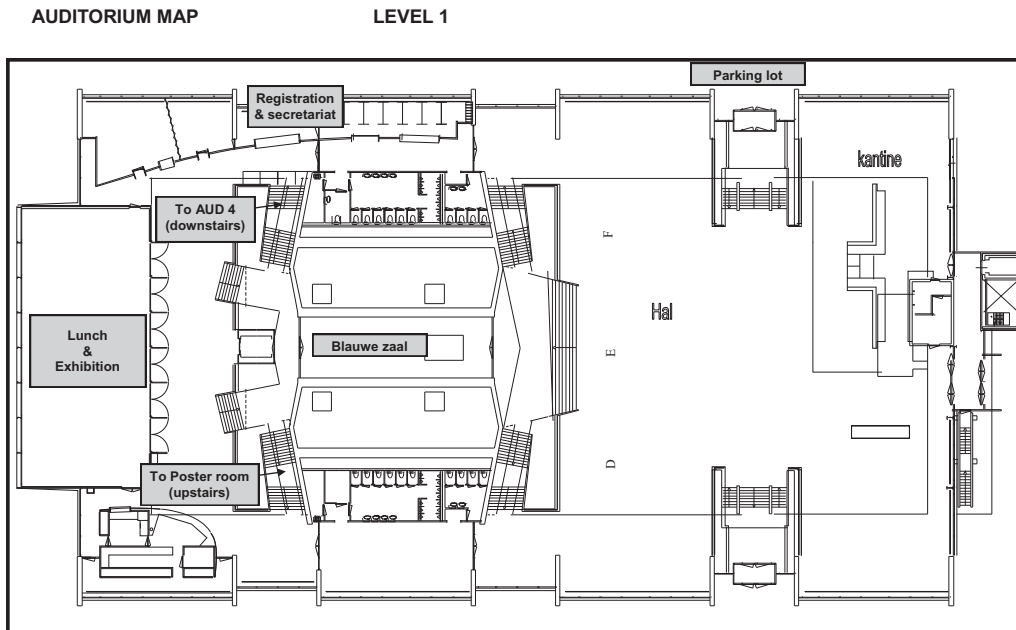
City and University map



**Campus of Eindhoven University of Technology**  
 Conference center Auditorium, Den Dolech 2, Eindhoven

## Symposium site maps

All technical sessions are held in the Auditorium congress center of Eindhoven University of Technology. The address is Den Dolech 2, Eindhoven.



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## WIFI Internet

Symposium attendees who wish to use the TU/e wireless network via their own laptops, may obtain temporary guest accounts. To obtain such an account please refer to the registration desk during the symposium.

Please note that the guest network is not secure; encryption is not applied.

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## Symposium secretariat

### Congress Office, Eindhoven University of Technology

**address /** Den Dolech 2, AUD 2.23  
5612 AZ Eindhoven  
the Netherlands

**tel /** +31 40 247 4000

**fax /** +31 40 245 8195

**email /** congressoffice@tue.nl

During LDIA 2011 the secretariat will be available at the registration desk.



# Technical program

## Timetable

<b>Monday July 4</b>	<b>Blauwe zaal</b>	<b>Auditorium 4</b>
9:00 - 9:50	Opening ceremony and plenary keynote session I	
9:50 - 11:30	Magnetic Levitation and Transport I (MLT-I)	Linear Induction Motors I (LIM-I)
11:30 - 12:30	Plenary poster Session I (PS-I)	
12:30 - 14:00	Lunch	
14:00 - 15:20	Linear Tubular Motors (LTM)	Actuators & Special Machines I (ASM-I)
15:20 - 15:50	Coffee break	
15:50 - 17:30	Linear Induction Motors II (LIM-II)	Modeling (MOD)
<b>Tuesday July 5</b>	<b>Blauwe zaal</b>	<b>Auditorium 4</b>
9:00 - 9:40	Plenary keynote session II	
9:40 - 11:20	Magnetic Levitation and Transport II (MLT-II)	Linear Motors (LMO)
11:30 - 12:30	Poster Session II (PS-II)	
12:30 - 14:00	Lunch	
14:00 - 15:20	Control of Synchronous Motors (CSM)	Linear Transverse Flux Machines (LTF)
15:20 - 15:50	Coffee break	
15:50 - 17:10	Linear Switched Reluctance and Stepper Machines (LSS)	Actuators and Special Machines II (ASM-II)
17:10 - 17:30	Plenary closing session	



## Plenary sessions

### Opening ceremony

*Date* Monday, Jul. 4, 9:00 - 9:10  
*Location* Blauwe Zaal  
*Session Chair* E.A. Lomonova



#### **Opening speech**

C.J. van Duijn  
*Rector Magnificus of Eindhoven University of Technology*

### Keynote Sesssion I

*Date* Monday, Jul. 4, 9:10 - 9:50  
*Location* Blauwe Zaal  
*Session Chair* E.A. Lomonova



#### **Linear Drives: an enabling technology for cost effective continuation of Moore's Law**

Jos Benschop  
*Senior Vice President Technology at ASM Lithography, Veldhoven, The Netherlands*

#### **Abstract**

Moore's Law dictates that every 18 months the number of transistors on an integrated chip doubles. This is first and foremost enabled by optical lithography printing ever smaller transistor on an integrated circuit.

ASML is market and technology leader in this multi-billion euro industry. State-of-the art immersion scanners, using 193 nm light and immersion optics with numerical aperture of 1.35, print 40 nm wide lines on a 300mm resist coated silicon wafer. To enable a cost-effective continuation of Moore's law the productivity of these optical lithography scanners have increased steadily over the last decades. Today's pixel rate exceeds 2 Terapixel/second. The combination of sub-nm precision and high acceleration continues to push the envelope of sensor-, actuator- and servo-technology as well as construction of linear drives.

After an introduction into IC fabrication, and the role of lithography, it will be explained how lithography, and linear drives used for lithography, have evolved over the years enabling a cost effective continuation of Moore's law. Key challenges for lithography as well as linear drive technology will be shared.

## Keynote session II

*Date* Tuesday July 5, 9:00 - 9:40  
*Location* Blauwe Zaal  
*Session Chair* J.C. Compter



### **15 Years of heavy duty linear drives in Material Handling**

Gert Bossink  
*Vanderlande Industries BV, Veghel, The Netherlands*

#### **Abstract**

Vanderlande Industries is a market leader in automated material handling solutions. In market segments like Baggage Handling, Parcel Sorting and Automated Warehouses we deliver complete solutions. When we installed 15 years ago a complete baggage handling system based on carts driven by linear asynchrone drives we felt pioneers that had to develop crucial elements. Nowadays we deliver systems to major airports based on this technology and synchrone and asynchrone drives are applied in all our market segments in various applications.

## Closing Ceremony

*Date* Tuesday July 5, 17:30 - 17:45  
*Location* Blauwe Zaal  
*Session Chair* J.W. Jansen

## Oral & Poster sessions / Monday July 4

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### Magnetic Levitation & Transport I (MLT-I)

Session type *Oral*  
Date *Monday, Jul. 4, 9:40 - 11:20*  
Location *Blauwe Zaal*  
Chair(s) *D. Ebihara*

- MLT-I.1** | **Stator Arrangement and Thrust Force Analysis of LSM with Disconnected Long Stator**  
(Page 36) | L. Shi  
*Institute of Electrical Engineering, Chinese Academy of Sciences, China*
- MLT-I.2** | **Development of Robust Electromagnetic Position Sensor for Linear Synchronous Motor in General Atomics Urban Maglev**  
(Page 38) | S Borowy and S Guroi  
*General Atomics, United States of America*
- MLT-I.3** | **The deformation of the moving magnet plate of a commutated magnetically levitated planar actuator**  
(Page 40) | J.M.M. Rovers, J. Achterberg, M.J.C. Ronde, J.W. Jansen, J.C. Compter, E. Lomonova, C.M.M. Lierop, van and M.J.G. Molengraft, van de  
*Eindhoven University of Technology, The Netherlands*
- MLT-I.4** | **Structure and Characteristics Analysis of a Novel Detent-force-based Magnetic Suspension System**  
(Page 42) | X. Xu  
*Henan Polytechnic University, China*
- MLT-I.5** | **Numerical Analysis of the Basic Levitation Characteristics of the Magnetically Levitated System using Two Phase Linear Motor**  
(Page 44) | S. Ohashi  
*Kansai University, Japan*

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### Linear Induction Motors I (LIM-I)

Session type *Oral*  
Date *Monday, Jul. 4, 9:40 - 11:20*  
Location *Auditorium 4*  
Chair(s) *J.F. Gieras*

- LIM-I.1** | **Novel FaultTolerant Concept for Linear Induction Drives**  
(Page 46) | J. Zentner, I. Odnokopylov, K. Obraztsov and G. Odnokopylov  
*TU Braunschweig, Germany*  
*Tomsk Polytechnic University, Russian Federation*

- LIM-I.2** | **An Analytical Method for Predicting Cogging Forces in Linear Induction Motors**  
(Page 48) | M. Rusli, D. Cook, D. Platt and W. Moscrop  
*University of Wollongong, Australia*
- LIM-I.3** | **Optimal design of a Double-Sided Linear Induction Motor using an Efficient Global Optimization**  
(Page 50) | J. Gong, A.C. Berbecea, F. Gillon, X. Cimetiere and P. Brochet  
*Université Nord de France-Ecole Centrale de Lille, France*
- LIM-I.4** | **Study of Pulse Drive Linear Induction Motor as the all Aluminum Motor**  
(Page 52) | D. Zohda and S. Torii  
*Tokyo City University, Japan*
- LIM-I.5** | **Investigation of active spherical wheels based on induction motor principle**  
(Page 54) | J. Zentner, T. Kochubey, K. Shaposhnikov and V. Astakhov  
*TU Braunschweig, Germany*  
*South Russia State Technical University, Russian Federation*

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## Poster Session I (PS-I)

*Session type* | *Poster*  
*Date* | *Monday, Jul. 4, 11:30 - 12:30*  
*Location* | *Poster Room*  
*Chair(s)* | *F. Sahin*

- PS-I.1** | **Winding and Mover Arrangement of Doubly Salient Permanent Magnet Linear Synchronous Motor for Reduction of Force Ripple and Magnetic Unbalance**  
(Page 56) | S. U. C. Chung, J. W. K. Kim, B. C. W. Woo, Y. D. C. Chun, D. K. H. Hong and J. Y. L. Lee  
*KERI, South-Korea*
- PS-I.2** | **Outlet edge Cogging Force Verification using Auxiliary teeth and pole at the Stationary Discontinuous Armature Linear Synchronous Motor**  
(Page 58) | Y.-J. Kim  
*Chosun University, South-Korea*
- PS-I.3** | **Study of the Velocity Ripple Suppression for Intermittent Stator Permanent Magnet Linear Synchronous Motor**  
(Page 60) | S. Kohno, H. Dohmeki and K. Suzuki  
*Japan*
- PS-I.4** | **Analysis of Thrust Constant, Electrical and Mechanical Time Constant of a Tubular Linear Permanent Magnet Motor in Spray Application**  
(Page 62) | A.K.M. Iqbal, I. Aris, N. Misron, M.H. Marhaban and A. Waqar  
*University Industri Selangor, Malaysia*  
*University Putra Malaysia, Malaysia*  
*International Islamic University, Malaysia*

- PS-I.5** | **Design of Safe Protection System for Rope-less Elevator Driven by Permanent Magnet Linear Synchronous Motor**  
(Page 64) | H.W. Zhang, F.S. Yu, X.H. Wang and F.H.Z. Wang  
*Henan Polytechnical University, China*  
*Henan Polytechnic University, China*
- PS-I.6** | **Analysis on Rotor Eddy Current Loss of Cylindrical Linear Oscillatory Actuator with Halbach Array Permanent Magnet Mover according to Driving Method**  
(Page 66) | K.J. Ko, S.M. Jang, J.Y. Choi and S.S. Jeong  
*Chungnam National University, South-Korea*  
*LG Electronics Incorporated, South-Korea*
- PS-I.7** | **The Dynamics Simulation of Air Levitation PM-LSM**  
(Page 68) | M. Morimoto, H. Dohmeki and T. Takahashi  
*Japan*
- PS-I.8** | **Optimal Design for 4 Pole 3 Slot Structure of the Intermittent Stator Permanent Magnet Type Linear Synchronous Motor**  
(Page 70) | A. Ishikawa, K. Suzuki and H. Dohmeki  
*Tokyo City University, Japan*  
*Aida Engineering Co. Ltd., Japan*
- PS-I.9** | **Design and characterization of a fractional slots tubular linear permanent magnet machine**  
(Page 72) | R. Di Stefano and F. Marignetti  
*University of Cassino, Italy*
- PS-I.10** | **Influence of design parameters and DC Link Voltage on Dynamic Performance of Slotless Double-sided PM Linear Synchronous Motor**  
(Page 74) | J.H. Choi, S.M. Jang, D.J. You, S.C. Han and J.P. Lee  
*Chungnam national university, South-Korea*  
*Chungnam provincial Cheongyang College, South-Korea*  
*Korea electric power research institute, South-Korea*
- PS-I.11** | **New Topology for High Force Linear Actuators with Tooth Windings**  
(Page 76) | C. Bode and W.R. Canders  
*TU Braunschweig, Germany*
- PS-I.12** | **Efficiency Improvement of Single-Side Linear Induction Motor with optimized secondary overhang length**  
(Page 78) | Y.S. Park  
*Chungnam National University, South-Korea*
- PS-I.13** | **Optimum Shape Design of Single-sided Linear Induction Motor Using Response Surface Method and Finite Element Method**  
(Page 80) | J.H. Lee and S.C. Lee  
*South-Korea*
- PS-I.14** | **Model of the Elliptec Resonant Piezoelectric Motor**  
(Page 82) | C. Kreischer, T.S. Kulig and M. Schlüter  
*TU Dortmund University, Germany*  
*HRW University of Applied Sciences, Germany*

- PS-I.15** | **Analysis of Power Loss and Mechanical Energy of a Giant Magnetostrictive Actuator**  
(Page 84) | B.T. Tomizawa, R. Takahashi, M. Hirashima, K.T. Tashiro, H.W. Wakiwaka, H. Yajima, T. Kanazawa and N. Fujiwara  
*Shinshu University, Japan*  
*SMC Co, Ltd, Japan*
- PS-I.16** | **A compact linear ultrasonic motor using H-Shape sandwiched stator**  
(Page 86) | C. Li, J. Zhang, H. Yao and S. Bao  
*Shanghai University, China*
- PS-I.17** | **Analysis of Braking Force on a Brushless DC-Planar Actuator Using Soft Magnetic Composite Material on the Secondary**  
(Page 88) | N F Baggio Filho and A. Flores Filho  
*Federal University of Rio Grande do Sul, Brazil*
- PS-I.18** | **Comparison of different topologies for a magnetically levitated planar actuator**  
(Page 90) | J.M.M. Rovers, J.W. Jansen, J.C. Compter and E. Lomonova  
*Eindhoven University of Technology, The Netherlands*
- PS-I.19** | **A Planar Linear Generator Mounted in Shoes for Energy Harvesting**  
(Page 92) | C.F. Wang  
*China*
- PS-I.20** | **Performance of Magnetic Actuator Capable of Linear Movement in a Pipe**  
(Page 94) | Y.H. Yaguchi  
*Tohoku Gakuin University, Japan*
- PS-I.21** | **Oscillatory Actuator for Optical Scanner Using Tortion Spring Made of Silicon Rubber**  
(Page 96) | T. Horio, T. Mizuno, Y. Teramae and K. Oyaizu  
*Shinshu University, Japan*
- PS-I.22** | **An innovant linear pulsatile pump for heart assistance circulatory**  
(Page 98) | J.F. Llibre, N. Martinez, P. Leprince and B. Nogarede  
*Laboratory LAPLACE - Université de Toulouse, France*  
*Institut de cardiologie APHP Pitie-Salpetriere, France*
- PS-I.23** | **Proposal of Two-Dimensional Linear Oscillatory Actuator for Self-Propelled Mechanism**  
(Page 100) | Y. Uematsu and S. Torii  
*Tokyo City University, Japan*

## Linear Tubular Motors (LTM)

Session type *Oral*  
Date *Monday, Jul. 4, 14:00 - 15:20*  
Location *Blauwe Zaal*  
Chair(s) *D.H. Kang*

- LTM.1** | **Cogging Force Analysis of a Slotless Tubular Linear Motor with Finite Stator**  
(Page 102) | P.A. Commins, J. Moscrop and C. Cook  
*University of Wollongong, Australia*
- LTM.2** | **Design of a Single-phase, Flux-switching, Tubular Permanent Magnet Machine for Refrigerator Applications**  
(Page 104) | J. Wang  
*University of Sheffield, United Kingdom*
- LTM.3** | **Overview of a Special Developed Linear Drive Concept with integrated Hydraulic Cylinder for Clutch-Brake-Combinations in Eccentric Presses**  
(Page 106) | S. Gruber, C. Junge, R. Wegener and S. Soter  
*University of Wuppertal, Germany*  
*Ortlinghaus-Werke GmbH, Germany*
- LTM.4** | **Direct-drive electromagnetic active suspension system with integrated eddy current damping for automotive application**  
(Page 108) | B.L.J. Gysen, J.J.H. Paulides and E.A. Lomonova  
*Eindhoven University of Technology, The Netherlands*

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## Actuators and Special Machines I (ASM-I)

Session type *Oral*  
Date *Monday, Jul. 4, 14:00 - 15:20*  
Location *Auditorium 4*  
Chair(s) *Y. Perriard*

- ASM-I.1** | **Design study on magnetic springs with low resonance frequency**  
(Page 110) | J.L.G. Janssen, J.J.H. Paulides, E.A. Lomonova, B. Delinchant and J.P. Yonnet  
*Eindhoven University of Technology, The Netherlands*  
*Laboratoire d'Electrotechnique de Grenoble (LEG), Domaine Universitaire, France*  
*Laboratoire de Génie Electrique de Grenoble, France*
- ASM-I.2** | **Experimental validation for the drive design of a linear driven total artificial heart**  
(Page 112) | A. Pohlmann, M. Lemann, A. Fritschi, T. Finocchiaro, U. Steinseifer and K. Hameyer  
*Institute of Electrical Machines / RWTH Aachen University, Germany*  
*Chair of Applied Medical Engineering / RWTH Aachen University, Germany*

- ASM-I.3** | **Examination of the Permanent Magnet Placement for Side Wall Type Superconductive Magnetic Levitation Device Realization**  
(Page 114) | Y. Tachikawa and S. Torii  
*Tokyo City University, Japan*
- ASM-I.4** | **Genetic Algorithm Design of EDS Hovering Coil**  
(Page 116) | S. Coene, J. Verveckken, W. Deprez and J. Driesen  
*Kuleuven, Belgium*

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## Linear Induction Motors II (LIM-II)

*Session type* Oral  
*Date* Monday, Jul. 4, 15:50 - 17:30  
*Location* Blauwe Zaal  
*Chair(s)* J. Shen

- LIM-II.1** | **Vector Control for Linear Induction Machine Considering End Effects**  
(Page 118) | M. Hajji, M.A. Nasr Khoidja and B. Ben Salah  
*ENIT, Tunisia*  
*ESSTHS, Tunisia*
- LIM-II.2** | **Decoupled Control of Thrust and Normal Force in a Double-Layer Single-Sided Linear Induction Machine**  
(Page 120) | T.T. Overboom, J.P.C. Smeets, J.W. Jansen and E. Lomonova  
*Eindhoven University of Technology, The Netherlands*
- LIM-II.3** | **Over-Phase Control of Inverter Multiphase AC Linear Drives**  
(Page 122) | A.V. Brazhnikov and I.R. Belozyorov  
*Siberian Federal University, Russian Federation*
- LIM-II.4** | **The measurement of the dynamic characteristics of LIM with experimental equipment using disc-shaped secondary side**  
(Page 124) | T. Morizane  
*Osaka Institute of Technology, Japan*
- LIM-II.5** | **Low cost sector machine to emulate a linear induction machine**  
(Page 126) | A.M. Tavares, A.F. Flores and Y.B. Blauth  
*Brazil*  
*Federal University of Rio Grande do Sul, Brazil*



## Modeling (MOD)

Session type *Oral*  
Date *Monday, Jul. 4, 15:50 - 17:30*  
Location *Auditorium 4*  
Chair(s) *P. Brochet*

- MOD.1** | **Forces Analysis in A Large Linear Synchronous Motor**  
(Page 128) | M. Mirzaei, A. Binder, B. Funieru, B. Zamzow and R. Waidhauser  
*Darmstadt University of Technology, Germany*  
*MAX BOEGL, Germany*
- MOD.2** | **Analytical Modeling of Planar and Tubular Linear PM Machines with Surface Mounted Magnets and Semi-Closed Slots**  
(Page 130) | Y. Amara and G. Barakat  
*GREAH (University of Le Havre), France*
- MOD.3** | **Analytical Computation of Asymmetrical Magnetic Circuits of Surface-Mounted Permanent-Magnet Linear Motors with Distributed and Concentrated Winding**  
(Page 132) | J. Jimenez, J.A. Malumbres Ruiz and M. Martínez-Iturralde  
*CEIT, Spain*  
*TECNUN University, Spain*
- MOD.4** | **Real-time 3D Thermal Modeling of a Magnetically Levitated Planar Actuator**  
(Page 134) | M. Stoeck, J.M.M. Rovers, J.W. Jansen, E. Lomonova and Y. Perriard  
*The Netherlands*  
*Eindhoven University of Technology, The Netherlands*  
*Ecole Polytechnique Federale de Lausanne, Switzerland*
- MOD.5** | **Coulombian Model for the 3D Analytical Calculation of the Torque Exerted on Cuboidal Permanent Magnets with Arbitrary Oriented Magnetizations**  
(Page 136) | H. Allag, J.P. Yonnet, R.E.H. Bouchekara and M.E.H. Latreche  
*Laboratoire de Génie Electrique de Grenoble, France*  
*Umm Al-Qura University,, Saudi Arabia*  
*Laboratoire dElectrotechnique de Constantine, Université de Constantine,, Algeria*

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## Banquet

*Monday, July 4. Busses leave at 17:45 in front of the symposium site.*

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## Oral & Poster sessions / Tuesday July 5

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### Magnetic Levitation & Transport II (MLT-II)

Session type *Oral*  
Date *Tuesday, Jul. 5, 9:40 - 11:20*  
Location *Blauwe Zaal*  
Chair(s) *S. Ohasi*

- MLT-II.1** | **Combination of a Contactless Power Supply with an Electromagnetic Guiding for a Vertical Transportation System**  
(Page 138) | R. Appunn  
*Institute of Electrical Machines, Germany*
- MLT-II.2** | **Development of Magnetically Levitated LCD Glass Conveyor**  
(Page 140) | C.-H. Kim, J.-M. Lee, H.-S. Han, B.-S. Kim and D.-S. Kim  
*Korea Institute of Machinery and Materials, South-Korea*
- MLT-II.3** | **A New Active Position Sensing Method For Ropeless Linear Motor Elevators**  
(Page 142) | C. Gurbuz and A. Onat  
*Turkey*  
*Sabanci University, Turkey*
- MLT-II.4** | **Laser interferometer measurements on a six-Degree-of-Freedom controlled moving-magnet planar actuator**  
(Page 144) | J. Achterberg, J.M.M. Rovers, C.M.M. Lierop, van and J.W. Jansen  
*Eindhoven University of Technology, The Netherlands*
- MLT-II.5** | **2 DOF Suspension System by Variable Flux Control Using a Rotary Disk Magnet**  
(Page 146) | K. Oka  
*Kochi University of Technology, Japan*

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### Linear Motors (LMO)

Session type *Oral*  
Date *Tuesday, Jul. 5, 9:40 - 11:20*  
Location *Auditorium 4*  
Chair(s) *A. Cassat*

- LMO.1** | **Research and Development of Linear Motor Technology in China During Recent Decade**  
(Page 148) | Y. Ye and Q.F. Lu  
*Zhejiang university, China*
- LMO.2** | **A Novel High Force Density Linear Electromagnetic Actuator**  
(Page 150) | J. Wang  
*University of Sheffield, United Kingdom*

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|----------------------------|---|
| <b>LMO.3</b><br>(Page 152) | <b>100G Linear Motor and its Precision Positioning</b><br>K. Sato<br><i>Tokyo Institute of Technology, Japan</i>  |
| <b>LMO.4</b><br>(Page 154) | <b>Short Primary Linear Synchronous Motor Drive with an Ultracapacitor Regenerative Braking System for Material Handling and Processing</b><br>T.R. Fernandes Neto and P. Mutschler<br><i>Darmstadt University of Technology, Germany</i> |
| <b>LMO.5</b><br>(Page 156) | <b>Commercial Electrical Linear Drives: A Review</b><br>A. EL-Refaie<br><i>United States of America</i>   |

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## Poster Session II (PS-II)

Session type *Poster*  
Date *Tuesday, Jul. 5, 11:30 - 12:30*  
Location *Poster Room*  
Chair(s) *J.J. Pyrhönen*

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|------------------------------|--|
| <b>PS-II.1</b><br>(Page 158) | <b>A Proposal of Linear Motor Driven Container Crane System</b><br>K. Fukuda and T. Nakagawa<br><i>Japan</i>   |
| <b>PS-II.2</b><br>(Page 160) | <b>Application Research on Permanent Magnet Linear Synchronous Motor for Vertical Hoist System</b><br>W. Xudong, F. Haichao, X. Baoyu and X. Xiaozhuo<br><i>China</i><br><i>School of Electrical Engineering and Automation of HPU, China</i><br><i>School of Mechanical and Power Engineering of HPU, China</i> |
| <b>PS-II.3</b><br>(Page 162) | <b>Ziegler-Nichols Based Intelligent Controller Design of a SPM System to Reduce the Hysteresis Effect of Force Actuator</b><br>J. M. Lin and P.K. Chang<br><i>Chung-Hua University, Taiwan</i>  |
| <b>PS-II.4</b><br>(Page 164) | <b>Sensorless control of EDS hovering coil</b><br>S. Coene, J. Verveckken, W. Deprez and J. Driesen<br><i>Kuleuven, Belgium</i>  |
| <b>PS-II.5</b><br>(Page 166) | <b>Optimum LIM Interval Selections of 3D Conveyor System for Control Algorithm Developments</b><br>J.H. Lee and B.D. Lee<br><i>South-Korea</i>   |
| <b>PS-II.6</b><br>(Page 168) | <b>Efficiency Optimization Control of Linear Induction Motor Drives with Reduction of Normal Force</b><br>K. Wang, L. Shi, Y. Li and Q. Ge<br><i>Institute of Electrical Engineering, Chinese Academy of Science, China</i>  |

- PS-II.7**  
(Page 170) | **Distributed Propulsion Control of SLIM Applied in Traction Devices**  
L. Wang and Q. Ge  
*China*  
*Institute of Electrical Engineering, Chinese academy of sciences, China*
- PS-II.8**  
(Page 172) | **Resonant Frequency Tracking Control for transverse-flux linear oscillating actuator**  
M. Yu, Q.F. Lu, Y. Ye, F. Ye and Z. Yao  
*China*  
*Zhejiang University, China*  
*Zhejiang jingtian Mechanical & Electrical Co., Ltd, China*
- PS-II.9**  
(Page 174) | **Direct Thrust-Force Control Scheme for a Tubular Linear Brushless Permanent-Magnet Actuator**  
I.C. Vese, F. Marignetti, C. Marginean and M. M. Radulescu  
*Technical University of Cluj-Napoca, Romania*  
*University of Cassino, Italy*
- PS-II.10**  
(Page 176) | **Vibration control with optimized sliding surface for active suspension systems using geophone**  
C. Ding, A.A.H. Damen and P.P.J. Bosch, van den  
*Eindhoven University of Technology, The Netherlands*
- PS-II.11**  
(Page 178) | **Comparison of MIMO control and decentralized control with optimal static decoupling**  
C. Ding, Y. Zhu, A.A.H. Damen and P.P.J. Bosch, van den  
*Eindhoven University of Technology, The Netherlands*
- PS-II.12**  
(Page 180) | **A Transverse Flux Linear Switched Reluctance Motor and its Drive**  
P.R.E. Eckert  
*Federal University of Rio Grande do Sul, Brazil*
- PS-II.13**  
(Page 182) | **Measurement of velocity of elastic wave in displacement sensor using magnetostrictive wire**  
Y.H. Hattori, M.U. Ueyama, T.I. Ito, H.W. Wakiwaka, K.T. Tashiro and X.C. Chang  
*Japan*  
*Shinshu University, Japan*  
*Taiyuan University of Technology, China*
- PS-II.14**  
(Page 184) | **Thermal Analysis of Surface-Mounted Permanent-Magnet Linear Motors Using A Lumped Parameter Thermal Model**  
J.A. Malumbres Ruiz, J. Jimenez and M. Martínez-Iturralde  
*Tecnun, Spain*
- PS-II.15**  
(Page 186) | **Electromagnetic hovering planar actuator**  
J. Soete, W. Deprez, S. Coene, J.V. Verveckken and J. Driesen  
*KULeuven, Belgium*
- PS-II.16**  
(Page 188) | **Development of Commercial Maglev Clean Lift**  
J.M. Kim and J.M. Cheon  
*Korea Electrotechnology Research Institute, South-Korea*

- PS-II.17** | **Experiment and Dynamic Simulation for Constant Speed Drive according to Levitation Air-gap Length of Linear Switched Reluctance Motor for Propulsion and Levitation System**  
(Page 190) | J. Park  
*South-Korea*
- PS-II.18** | **Study of Permanent Magnet Dispersed Placement Type of Electrodynamic Suspension System Using Nonmagnetic Conductor Sheet**  
(Page 192) | Y. Fujita and S. Torii  
*Tokyo City University, Japan*
- PS-II.19** | **Observation of Diamagnetic Repulsion Force Concerning Contact-free Linear Motion by using Diamagnetic Graphite Plate**  
(Page 194) | T. Masaki  
*Fukushima National College of Technology, Japan*
- PS-II.20** | **Design and Comparison of Two Actuators for Elevator Electromagnetic Active Suspension**  
(Page 196) | P.R.E. Eckert, A.F.F. Flores Filho, M.A. Silveira, da and V. Rinaldi  
*Federal University of Rio Grande do Sul, Brazil*  
*Lutheran University of Brazil, Brazil*  
*State Company of Electrical Energy, Brazil*
- PS-II.21** | **Design and Control of Magnetic Bearings for Rotary-Linear Motion Applications**  
(Page 198) | R. Zanis, K.J. Meessen, J.C. Compter and E.A. Lomonova  
*Eindhoven University of Technology, The Netherlands*
- PS-II.22** | **Control of the LSM for Super Speed Maglev Train**  
(Page 200) | H. Lee, B.S. Lee, B.B. Kang and H. Park  
*Korea Railroad Research Institute, South-Korea*
- PS-II.23** | **Results of complex optimization of maglev transport system**  
(Page 202) | M. Umanov, A. Lascher and H. Prishedko  
*Dnepropetrovsk National University of Railway Transport, Ukraine*  
*Technical University of Dresden, Institute for Electric Transport Systems, Germany*  
*Institute of the Transport Systems and Technologies of the National Academy of S, Ukraine*
- PS-II.24** | **Analysis and Design of Contactless Power Transformer for high-Speed Maglev Train**  
(Page 204) | D. Lee, S.Y. Jung, S. Lee and C.Y. Im  
*Dong-A university, South-Korea*
- PS-II.25** | **Experimental results of a linear-motor-type track brake that requires no large capacity power source**  
(Page 206) | T. Kashiwagi, Y.S. Sakamoto, H.H. Hasegawa, T.S. Sasakawa and Y. Karino  
*Railway Technical Research Institute, Japan*
- PS-II.26** | **Effect of the Reaction Plate Discontinuance on the Performance of a Single-sided LIM**  
(Page 208) | Y.M. Du, T.J. Zhou, R.H. Zhang and N.Q. Jin  
*Institute of Electrical Engineering, China*

- PS-II.27** | **Design of Hybrid-Excited Linear Synchronous Motor for Magnetically Levitated Vehicle**  
(Page 210) | C.-H. Kim, H.-W. Cho, J.-M. Lee, H.-S. Han, B.-S. Kim and D.-S. Kim  
*Korea Institute of Machinery and Materials, South-Korea*  
*Chungnam National University, South-Korea*
- PS-II.28** | **Design and Analytical Representation of Linear Induction Motor for Urban Transportation**  
(Page 212) | S.E. Abdollahi and M. Mirzaei  
*University of Tehran, Iran*  
*Darmstadt University of Technology, Germany*

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## Control of Linear Synchronous Motors (CSM)

*Session type* Oral  
*Date* Tuesday, Jul. 5, 14:00 - 15:20  
*Location* Blauwe Zaal  
*Chair(s)* W.R. Canders

- CSM.1** | **Controls of Long Stator Linear Motors - Application to Multi Mobile System**  
(Page 214) | A. Cassat, B. Kawkabani and Y. Perriard  
*EPFL-STI-IMT-LAI, Switzerland*  
*EPFL-STI-IEL-LME, Switzerland*
- CSM.2** | **Robust control of a direct-drive electromagnetic active suspension system**  
(Page 216) | T.P.J. Sande, van der, B.L.J. Gysen, I.J.M. Besselink, J.J.H. Paulides, E.A. Lomonova and N. Nijmeijer  
*Eindhoven University of Technology, The Netherlands*
- CSM.3** | **Mechanically linked, g-force free linear drives test bench**  
(Page 218) | M. Rehm and H. Schlegel  
*TU Chemnitz, Germany*
- CSM.4** | **Permanent magnet linear motor driven by an industrial frequency converter using standard torque controller of permanent magnet synchronous motors**  
(Page 220) | M. Huikuri, . Jokinen, . Niemelä and J. Pyrhönen  
*Lappeenranta University of Technology, Finland*

## Linear Transverse Flux machines (LTF)

Session type *Oral*  
Date *Tuesday, Jul. 5, 14:00 - 15:20*  
Location *Auditorium 4*  
Chair(s) *J.B. Wang*

- LTF.1** | **The design of flux concentrated type transverse flux cylindrical PMLSM for high thrust**  
(Page 222) | J.S. Shin, T. Koseki and H.J. Kim  
*Japan*  
*The University of Tokyo, Japan*  
*Sung-Jin Royal Motion Co. Ltd, South-Korea*
- LTF.2** | **Analysis of a Transverse-Flux LIM with Magnetically Suspended Reaction Plate**  
(Page 224) | J.F. Gieras, Z. Gientkowski, J. Mews and P. Splawski  
*University of Technology and Life Sciences, Poland*
- LTF.3** | **Design of a Novel Tubular Transverse Flux Reluctance Machine**  
(Page 226) | D.C. Popa, V.I. Gliga, V.I. Iancu and L. Szabo  
*Technical University of Cluj-Napoca, Romania*
- LTF.4** | **Investigation of a novel transverse-flux linear oscillating actuator with moving magnet**  
(Page 228) | Q.F. Lu, M.H. Yu, Y. Ye and Y.T. Fang  
*Zhejiang University, China*

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## Linear Switched Reluctance and Stepper Machines (LSS)

Session type *Oral*  
Date *Tuesday, Jul. 5, 15:50 - 17:10*  
Location *Blauwe Zaal*  
Chair(s) *J. Zentner*

- LSS.1** | **Direct Driven Conveyor**  
(Page 230) | J.-P. Jastrzembski and B. Ponick  
*Universität Hannover, Germany*
- LSS.2** | **Spherically Symmetric Characteristics of a Hexahedron and Octahedron Based Spherical Stepping Motor**  
(Page 232) | T. Yano  
*National Institute of Advanced Industrial Science and Technology, Japan*
- LSS.3** | **Study of Design Parameters Influence on Static and Dynamic Behaviors of Linear Step Actuators**  
(Page 234) | EAL El Amraoui, F. Gillon, P. Brochet and M. Benrejeb  
*Ecole Nationale d'Ingénieurs de Tunis, Tunisia*  
*Université Lille Nord de France, France*

- LSS.4** | **Linearization of the reluctance force actuator based on the parametric hysteresis inverse and a 2D spline**  
(Page 236) | A Katalenic, J. Boeij, de, C.M.M. Lierop, van and P.P.J. Bosch, van den  
*Eindhoven University of Technology, The Netherlands*  
*TMC Mechatronics, The Netherlands*

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## Actuators and Special Machines II (ASM-II)

*Session type* Oral  
*Date* Tuesday, Jul. 5, 15:50 - 17:10  
*Location* Auditorium 4  
*Chair(s)* J.-P. Yonnet

- ASM-II.1** | **Vibrating linear proportional actuators for shaver and hair-clipper applications**  
(Page 238) | G. Loussert, M Delbaere and R. Arlot  
*Moving Magnet Technologies, France*

- ASM-II.2** | **Springless Resonant Linear PM Oscillomotors?**  
(Page 240) | S.C. Agarlita, I. Boldea and L. N. Tutelea  
*Politehnica University of Timisoara, Romania*

- ASM-II.3** | **Contact-free Micro Displacement Characteristics of Diamagnetic Graphite Plate above Two Dimensional Halbach PM Array**  
(Page 242) | H. Suzuki  
*Fukushima National College of Technology, Japan*

- ASM-II.4** | **Linear Hybrid Actuator for Active Force Cancellation**  
(Page 244) | D.A.H. Laro, J. Dams and J. Eijk, van  
*MI-Partners BV, The Netherlands*  
*Magnetic Innovations, The Netherlands*  
*MICE BV, The Netherlands*

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## Closing session

Tuesday, July 5, 17:10 - 17:30



## **Presentation guidelines**

### **Oral presentation**

A regular oral presentation is 20 minutes per speaker including discussion. This time limit should be strictly followed. The organization will provide a notebook, LCD projector, screen and microphone in each oral session room. Presentations should be prepared in MS-Powerpoint format in English.

Please bring your powerpoint presentation on USB stick or CD and upload it to the supplied notebook before the sessions starts. Each presenter is also asked to submit their short autobiography to the session chair before the beginning of the session.

### **Poster presentation**

The maximum size of the posters is A0 portrait (85 x 120cm w x h). An author should set up the poster at least 15 minutes before the session starts, and **MUST** be present at his/her poster during the session. The conference provides a small sign designating the paper number to be posted on each board. Mounting materials will be provided.

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## Post symposium publication

After the conference, authors will be invited to resubmit their work to the IEEJ Transactions of Industry Applications or the IFAC Mechatronics Journal.

### IEEJ Transactions of Industry Applications

The Transactions of the Institute of Electric Engineers of Japan (IEEJ) are an important source of information delivered monthly to the society members directly. They are a public forum for communicating expeditiously and extensively to the members, the results of new research, development and applications that contribute to the scientific research and technology in electric engineering.

### IFAC Mechatronics Journal

A Journal of IFAC, the International Federation of Automatic Control Mechatronics is the synergistic combination of precision mechanical engineering, electronic control and systems thinking in the design of products and manufacturing processes. It relates to the design of systems, devices and products aimed at achieving an optimal balance between basic mechanical structure and its overall control.

The purpose of this journal is to provide rapid publication of topical papers featuring practical developments in mechatronics. It will cover a wide range of application areas including consumer product design, instrumentation, manufacturing methods, computer integration and process and device control, and will attract a readership from across the industrial and academic research spectrum. Particular importance will be attached to aspects of innovation in mechatronics design philosophy which illustrate the benefits obtainable by an a priori integration of functionality with embedded microprocessor control. A major item will be the design of machines, devices and systems possessing a degree of computer based intelligence. The journal seeks to publish research progress in this field with an emphasis on the applied rather than the theoretical. It will also serve the dual role of bringing greater recognition to this important area of engineering.

