2023 International Conference on **Electromechanical and Energy** Systems (SIELMEN 2023)

Craiova, Romania 11 – 13 October 2023



IEEE Catalog Number: CFP23L58-POD ISBN:

979-8-3503-1525-7

Copyright © 2023 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

*** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

 IEEE Catalog Number:
 CFP23L58-POD

 ISBN (Print-On-Demand):
 979-8-3503-1525-7

 ISBN (Online):
 979-8-3503-1524-0

Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400

Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com



TABLE OF CONTENTS

Plenary Session

Chairs: Dorin Lucache, Ilie Nucă, Mihaela Popescu

- Mihai Iordache, Dragoș Niculae, Lavinia Bobaru, Marilena Stănculescu, Oana Drosu, Anton Anastasie Moscu: *Dedicated Analog Circuit Simulation Programs...*1
- Vasile Rachier, Octavian Mangos, Ion Sobor: The Southern Development Region of the Republic of Moldova in context of the wind energy potential...7
- Alexandru Bitoleanu, Mihaela Popescu, Constantin Vlad Suru: *Implementation of Rotor Flux-Oriented Control on Traction System of Autonomous Electric Locomotives...*13
- P04 Aurel Campeanu : Current Issues in the Dynamics of Electrical Machines...N/A
- Mehmet Murat Tezcan: Design and Manufacturing Aspects of a Lightweight Racing Electric Vehicle...19

Regular sessions

EM - Electrical Machines MMS - Metrology and Measurement Systems

Paper ID

Chairs: Ion Voncilă, Svilen Rachev, Adrian Țurcanu Chairs: Petru Todos, Leonard Livadaru, Mihai Munteanu

- Influence of the Mechanical Equipment on the Drive Behavior of an Electric Vehicle—Svilen Rachev, Yanko Takavidov, Lyubomir Dimitrov, Dimitrina Koeva...25
- Research using modular resistive power load blocks for frequent starting of wound rotor induction motor, used in High Power Testing Laboratories Ocoleanu Daniel Constantin, Salceanu Cristian Eugeniu, Ionescu Mihai, Mihaita Ovidiu, Iovan Daniela, Nicola Marcel, Ghiorlan Andrei...31
- Inner-Rotor And Outer-Rotor PMSG Designs for Novel Offshore Wind Turbines Seyed Abolfazl Mortazavizadeh, Reza Yazdanpanah, David Campos-Gaona, Olimpo Anaya-Lara...36
- 62 Influence of nonlinearity and driving angles on the functional and performance characteristics at SRMs Ion Voncilă, Elena Selim...41
- Simulation and control of a nine phase induction machine used in propulsion system for electric vehicles Iulian Balan, Alexandru-Iulian Timofte, Vasile Horga, Alexandru Sălceanu...47
- A novel sensorless control of a hybrid excitation synchronous machine used in the field of electric traction Alexandru Timofte, Iulian Balan, Vasile Horga, Alexandru Salceanu...55

- 78 Improving performance of low-cost microcontroller equipment, based on systematic errors correction Constantin-Daniel Oancea, Daniel Bostan, Viorel Constantin Petre...62
- Numerical Analysis and Experimental Validation of a Series Hybrid Excitation Synchronous
 Machine Adrian Munteanu, Bogdan Virlan, Leonard Livadaru, Ionut Nacu, Ion Nastas, AnaMaria Dumitrescu...66
- Comparative Analysis between Distributed and Fractional Slot Concentrated Winding of a Wound Rotor Synchronous Machine Bogdan Virlan, Leonard Livadaru, Adrian Munteanu, Ionut Nacu, Ion Nastas, Alecsandru Simion...72
- 97 Assessing Frequeny Variability Using Long Term High Reporting Rate Measurements Anca Petruta Brincoveanu, Efstathios Fiorentis, Ana-Maria Dumitrescu, Mihaela Albu...76
- 151 Improved distance measurement using ultrasonic sensors Cristian Zet, Cristian Fosalau, Anamaria Hariton, Gabriel Constantin Sarbu...82
- Test-Based Analysis of Fault Tolerance Capability of Six-Phase Asynchronous Motors Ghenadie Tertea, Petru Todos, Ilie Nuca, Vadim Cazac...87

EERR - Energy Efficiency and Renewable Resources

- Paper ID Chairs: Olimpiu Stoicuta, Corina Maria Dinis, Octavian Mangos Chairs: Gheorghe Manolea, Gelu Gurguiatu, Dumitru Braga Chairs: Victorita Radulescu, Victor Gropa, Radu Dumitru Pentiuc
 - An Analysis of the Power Factor Compensation Within the Power Grid of an Industrial Plant by Means of Supervised Learning Methods Lia Elena Aciu, Adrian Danila...93
 - 72 The role, the importance and econometric analysis of nuclear power production in Romania and European Union Nadia Elena Stoicuta, Olimpiu Stoicuta...99
 - 76 Experimental Investigations of the Operation of Capacitors Driven by SSRs Corina Maria Dinis, Gabriel Nicolae Popa, Angela Iagar...105
 - 77 Experimental Investigations of the Operation of LC filters Driven by SSRs Corina Maria Dinis, Gabriel Nicolae Popa, Raluca Oana Sonia Rob...111
 - Electric Discharges and Dielectric Barrier Influence on Electric Field Distribution in Solar Air

 98 Heater Systems Visarion Catalin Ifrim, Laurentiu Dan Milici, Teodor Pop, Constantin Ungureanu...117
 - 107 Improving the ecological performance of free-piston gas generator by air-gas mixture self-ignition Andrei Zelentsov, Alexei Abakumov...128
 - Power Quality Considering the Massive Integration of Variable Renewable Energy Sources Dumitru Braga...132
 - 30 Energy crises energy transition driving force Dumitru Braga, Corina Gutu-Chetrusca...138
 - Solar Tracking Systems for Photovoltaic Panel Made for Educational Purposes Ionel-Laurentiu Alboteanu, Gheorghe Manolea, Cristian Bratu...144

- 92 Energy performance assessment for operational PV installations Gelu Gurguiatu...N/A
- Photovoltaic Stations with NPC Inverters Adjusted by Specific Control and PWM Schemes and Algorithms Valentin Oleschuk, Mihai Lupu...150
- Heat Pumps Use for Increasing Heat Power Plant Efficiency. A preliminary Analysis for District
 Heating in Bălţi City of Moldova Cristina Efremov, Marian Brinza, Mihai Sanduleac,
 Constantin Ionescu, Alexandru Sandulescu...156
- 130 Intensity of the waves from the Black Sea an energetic advantage but also a risk of coastal erosion Victorita Radulescu...162
- 142 Cost-Benefit Analysis for renewable energy generation in a hotel-type building Alina Ionela Sumovschi, Radu Dumitru Pentiuc, Pavel Atănasoae...167
- Low speed direct drive electrical generator for multi-blade wind turbine application Stefan Breban, Marius Drancă, Mihai Chirca...172
- Determination of wind characteristics for different heights based on digital maps of the wind potential of the Republic of Moldova Octavian Mangos, Vasile Rachier, Ion Sobor...176
- 159 Practical aspects of implementing street and park lighting projects Victor Gropa, Mihai Sanduleac, Nicolae Mogoreanu, Radu Porumb, Iulian Rotari...180

ARM - Automation, Robots and Mechatronics

EA - Electrical Apparatus

PED - Power Electronics and Drives

ETAE - Electrical Traction and Automotive Equipment

Paper ID

Chairs: Marcel Nicola, Alin-Iulian Dolan, Iurie Nuca

Chairs: Adrian Graur, Marian-Silviu Poboroniuc, Irina Cojuhari

Chairs: Cristian Daniel Cismaru, Valentin Oleschuk, Marcel Burduniuc

Chairs: Alexandru Bitoleanu. Mitrofan Curti

- Experimental Study of the Pressure Exerted in the Body of a High-Voltage Fuse Cristian-33 Eugeniu Sălceanu, Cătălin Dobrea, Marcel Nicola, Daniel Constantin Ocoleanu, Stefan Seitan, Daniela Iovan, Mihai Ionescu, Ovidiu Mihaita...184
- Improvement Performances of Sensorless Control for PMSM Based on FOC Strategy Using
 Luenberger Observer, Sine Cosine Algorithm, and RL-TD3 Agent Marcel Nicola, Claudiulonel Nicola...190
- Useful Experiment Based Formulas for Estimating the Heating of Crimped Connections Alin-Iulian Dolan...197
- Optimization of Cylindrical Blades for Wind Turbine Based on Magnus Effect Galina Demidova, Aleksandr Lukin, Dmitry Lukichev, Nikolai Poliakov, Alecksey Anuchin...202
- Research and Design Microgrid using Ocean Wave Energy for Electric Vehicles Load on Islands in Vietnam Hung Nguyen Van, Minh Nguyen Quoc...208

- Remote Health Monitoring System to Prevent the Spread of Contagious Viruses Marian-Ştefan Nicolae, Florentina-Fulgina Bizic, Nicolae-Leonide Sîrbu, Iurie Nucă, Raluca-Cristina Presură...214
- 90 3D Printed Upper Limb Prosthesis Controlled by the Healthy Hand Stefan-Adrian Ionescu, Marian-Silviu Poboroniuc...218
- 93 Data-Driven Control of the Second Order Inertial Systems with Astatism Irina Cojuhari...224
- Basic Aspects of the Theoretical and Practical Relevance of the Method of Synchronous Multi-Zone PWM for Power Inverters - Valentin Oleschuk, Mihai Tirsu...228
- Comparative Analysis of Controller Tuning Methods for Second-Order Time Delayed Object
 Model with Astatism Bartolomeu Izvoreanu, Irina Cojuhari, Ion Fiodorov, Dumitru Moraru,
 Adrian Secrieru, Mihail Potlog...236
- Comparative Analysis of Controller Tuning Methods for First-Order Inertia Object Model with
 Astatism and Non-Minimum Phase Bartolomeu Izvoreanu, Adrian Secrieru, Irina Cojuhari,
 Ion Fiodorov, Dumitru Moraru, Mihail Potlog...241
- Comparative analysis of regime parameters of longitudinal-transverse booster transformers Mihai Stefan Tirsu, Dmitrii Zaitsev, Irina Golub, Danila Kaloshin...246
- 91 Stabilization of Inverter Losses in a Traction Drive of Electric Vehicle Yousef Ali, Maxim Lashkevich, Dmitry Aliamkin, Evgeniy Stolyarov, Egor Kulik, Alecksey Anuchin...252
- 101 Train motion study using Matlab/App Designer Cristian Daniel Cismaru, Mircea Adrian Drighiciu...258
- Designing of Variable Input Multiphase Buck Converter with Efficient Phase Current Balancing Technique Md Nafeez Rahman, Danis Farrakhov, Viacheslav Vavilov...263
- Design Control System of Three Phase Bidirectional DC/DC Converter for Autonomous Gas

 Turbine Power Plant Andrey Chepiga, Viktor Monin, Aleksandr Aleksandrov, Dinara
 Yumasheva, Yuriy Kalachev, Sergei Petrenko...269
- Modified Schemes of Control and Multi-Zone PWM of Diode-Clamped Inverters of Drive Installations Irina Vasiliev, Mihai Tirsu, Valentin Oleschuk...274
- Current Regulation in Case of Open Circuit Fault for Six-phase Traction Open-end Winding Machine Evgeniy Stolyarov, Yousef Ali, Maxim Lashkevich, Ksenia Fedorova...280
- 40 Estimation of the Rotor Flux in the Traction Systems with Induction Motors and Field-Oriented Control Mihaela Popescu, Alexandru Bitoleanu, Constantin Vlad Suru...284
- Equipment and Methodology for Detecting Clearance in Front Suspension Joints of Passenger Vehicles by Using Dynamic Acceleration Ioan Pavel, Alexandru-Polifron Chirita, Radu-Iulian Radoi, Andrei-Alexandru Benescu, Gheorghe Sovaiala, Ana-Maria Carla Popescu...290
- 79 System-Level Modelling, Analysis, and Validation of a Soccer Robot's Shooting Mechanism Gijs G. H. Peters, Mitrofan Curti...295
- Implementation of Hysteresis Current Controllers with Switching Frequency Limitation for Electric Traction Systems with Induction Motor and Rotor Field Orientation Control Using dSpace Prototyping Board Constantin Vlad Suru, Alexandru Bitoleanu, Mihaela Popescu, Tiberiu Matusa...302

- 144 In-wheel slotless permanent magnet electrical machines for solar vehicle propulsion Vincent Dury, Lionel Steeve Gounou Kouontchou, Mihai Chirca, Stefan Breban...308
- Performance Analysis of an Urban Passenger Vehicle Powertrain Operating in Various Driving
 Cycle and Speed Profiles Using MatLab Simscape Models Adrian Turcanu, Ilie Nuca,
 Vadim Cazac...312

PGTD - Power Generation, Transport and Distribution RD - Reliability and Diagnosis Paper ID Chairs: Viorica Hlusov, Dragos Niculae

Chairs: Viorica Hlusov, Dragos Niculae

Chairs: Valeriu Bosneaga, Lia Aciu, Iulian Rotari

- Assessment of the Economic Efficiency of Reactive Power Compensation Measures In Electrical Distribution Networks Viorica Hlusov, Corina Gutu-Chetruşca, Elena Vasilos...318
- The analysis of the influence of load asymmetry on the operating regimes of transformers with various connection schemes Adrian Rotaru, Iulian Rotari, Ion Stratan...N/A
- 43 Device for monitoring the condition of people with balance problems Constantin-Daniel Oancea...323
- 65 Availability of hydro generating units based on the maintenance schedule Ionuţ Ilişescu, Ciprian Nemeş, Florin Constantin Băiceanu...327
- Determining the Occupancy Patterns and Typical Power Demand Profiles of the Electric

 Vehicle Charging Stations Using a Flexible Clustering-based Data Mining Framework Ecaterina Chelaru, Vasilica Dandea, Livia Noroc, Gheorghe Grigoras...334
- Modeling the impact produced by 400 kV power lines on the environment using Fuzzy logic Victorita Radulescu...340
- Steady State Condition of cable line 10 kV at single-phase to ground fault with resistive Neutral Earthing Valeriu Bosneaga, Victor Suslov, Ion Stratan, Ina Dobrea...346
- Monitoring of classical and modern education Costel Donose, Cristina Mihaela Schreiner, Ionel Pavel, Madalina Ancuta Pintilei...352
- Loop Closing of Flyback Switching Power Supply Using Capacitive Coupling Ovidiu Lăudatu, Mihai Iordache, Marilena Stănculescu, Lavinia Bobaru, Dragoș Niculae, Emil Cazacu...356
- Current Trends in Power Factor Compensation: Insights and Perspectives Gabriel Ioana, Emil Cazacu, Marilena Stănculescu, Dragoş Niculae, Mihai Iordache...362
- Study and Design of a Teaching Electrical Engineering System Based on Motion Sensors Using Arduino Laura-Mihaela Lelutiu, Lia Aciu...368

IA - Industry Applications

Paper ID

Chairs: Claudiu-Ionel Nicola, Jose Alfonso Antonino-Daviu, Vadim Cazac

Considerations on the Behaviour of Protective Clothing Against the Thermal Hazards
Caused by an Electric Arc - Cristian-Eugeniu Salceanu, Catalin Dobrea, Marcel Nicola, Daniel

- Causea by an Electric Arc Cristian-Eugeniu Salceanu, Catalin Dobrea, Marcel Nicola, Danie Constantin Ocoleanu, Stefan Seitan, Daniela Iovan, Mihai Ionescu, Andrei Ghiorlan...374
- 60 Determination and Monitoring of the Overhead Electricity Transmission Cables Sag Claudiu-Ionel Nicola, Marcel Nicola...380
- 61 Automation of Dust Removal Process and Application in Industrial Environment Florin Teisanu, Claudiu-Ionel Nicola, Marcel Nicola...385
- Fault Diagnosis in Electric Motors through the Analysis of Currents and Stray Fluxes Jose Alfonso Antonino-Daviu, Israel Zamudio-Ramirez, Roque Alfredo Osornio-Rios, Larisa Dunai...390

EEE - Engineering Education and EvocationsPaper ID **ME - Management and Entrepreneurship**

Chairs: Cristian Gyozo Haba, Radu Zlatian

- 67 Verification and validation of safety critical system requirements Radu Zlatian, Ovidiu Drescă...397
- Using AR in technical education. The ARphymedes case Dumitru Dorin Lucache Cristian Gyozo Haba, Mihaita Emanuel Anton, Carmen Tita...401
- System for Monitoring Electrical Cables Condition in Building Installation George Balan, Nelu Cristian Chereches, Dorin Dumitru Lucache...405
- 152 Interior lighting, a challenge for yesterday's and today's engineering Iulian Gherasim, Catalin Daniel Galatanu...411

Special Session

CEEPUS Session on E-Learning and E-Management

Paper ID Chairs: Galia Marinova, Corina-Guţu Chetruşca

- 125 FPGA Power Consumption Optimization Methods Analysis Marsida Ibro, Galia Marinova...418
- Web-based calculator tool for FPGA power consumption estimation for teaching purposes Marsida Ibro, Galia Marinova...422
- 121 Comparative study of compression functions in modern web programming languages Krisel Tola...426
- Comparison and Rule-Based implementation in IMA-NET of PHP compression functions -Krisel Tola, Galia Marinova...431

Session Poster - 1

Paper ID Chairs: Sorin Ioan Deaconu, Costică Niţucă, Vadim Cazac

- Numerical modeling of two-dimensional conduction for different wall structures Felicia Elena Stan Ivan, Cosmin Gabriel Buzatu, Adelaida Mihaela Duinea...437
- 23 The comparative study regarding radiative cooling systems Cristina Prodan...445
- Comparative study in terms of the energy supply of a residential house, through different methods Cristina Prodan, Nicolae Carpiuc, Sebastian Anton...449
- Increasing the efficiency of the drying process of fruit products with the application of microwave tunnel treatment Victor Popescu, Mihail Melenciuc, Mihail Balan, Vitali Vişanu, Onorin Volconovici...453
- Estimating the influence of random factors on the operational reliability of electricity supply networks Victor Popescu, Vadim Cazac, Dinu Voinesco, Ghenadie Tertea, Anatol Cecan, Tatiana Todiras...457
- Design and Monitoring of a Domestic Solar Power Plant Ion Cristian Popa, Alexandru Bitoleanu, Mihaita Linca...462
- 47 Infrared Monitoring of Low Voltage Switch Separator Contact Resistance Alin Dragomir, Maricel Adam, Gabriel Chiriac, Dragos Murgoci, Adrian Vîlcu, Costică Nitucă...467
- Influence of Thermal Agent Production Method on Thermal Energy Costs Radu Cristian Dinu, Felicia Elena Stan Ivan, Maria Silvia Diga, Dan Gabriel Stanescu...472
- Influence of the single-phase fault passing resistance on the shunt breaker technical efficiency Ion Marin, Paul-Mihai Mircea, Doru Ursu, Cristian Bratu, Eugen Butoarca, Ion Mircea...480
- Optimizing Energy Production for Wind Turbines Operating in Variable Wind Speed Conditions
 Cristian Paul Chioncel, Elisabeta Spunei, Ovidiu-Gelu Tirian...486
- Using the variable flow hydropower potential of a drinking water supply pipe of a small town Sorin Ioan Deaconu, Radu-Mihnea Babau, Marcel Topor, Feifei Bu...492
- 118 Influence of the Wind Speed Amplitude on the Energy Captured by a Wind Turbine Operating at Time-Varying Wind Speeds Cristian Paul Chioncel, Elisabeta Spunei, O.-G. Tirian...498
- Magnetic Circuit Segmentation Effects on Fractional Slot Concentrated Winding Synchronous
 Machine with Grain Oriented Electric Steel Leonard Livadaru, Bogdan Virlan, Adrian Munteanu, Ionut Nacu, Alecsandru Simion, Ion Nastas...504
- Comparative Analysis of Performances of Photovoltaic Power Plants Linca Mihaita, Popa Ion, Suru Constantin Vlad, Ravigan Florin...508
- Development of the Six-Phase Static Converter with Symmetrical and Asymmetrical Control for Electric Vehicles Ilie Nuca, Vadim Cazac, Alexandr Motroi, Corneliu Gherțescu, Vitalie Eşanu...514
- Electric Vehicle Architecture Modeling Based on Matlab and SysML for Discrete and Continuous Simulation Vlad-Andrei Scarlatache, Sebastian Aradoaei, Marius Andrei Olariu, Florina Scarlatache, Tudor Alexandru Filip, Ramona Simionescu...520

Session Poster - 2

Paper ID Chairs: Mihai Iordache, Elisabeta Spunei, Mihai Tîrşu

- Complementary analysis of the fault condition of transformers in service Maria Cristina Nitu, Ancuta-Mihaela Aciu...525
- 42 Analysis of the evolution of electricity production in Romania Elisabeta Spunei, Andrea-Amalia Minda, Ion Piroi, Naomi-Ionela Şoanda...530
- Study Regarding the Level of a Hydrogenerator Partial Discharges Elisabeta Spunei, Gheorghe Liuba, Calin-Octavian Miclosina...535
- Factors Influencing the Optimization of Magnetically Coupled Coil Structures-Analysis and Discussions Lavinia Bobaru, Dragoş Niculae, Georgiana Rezmeriţă, Marilena Stănculescu, Mihai Iordache, Oana Drosu, Sorin Deleanu...541
- Conceptual design for the performance of public infrastructure and utilities in urban water treatment plants Moldovan Artiom, Nuca Ilie, Milici Dan, AbuBandora Mahmoud...547
- 82 Sensory system based on intelligent sensors for the implementation of a modern weather station Marius Branzila, Ştefan-Andrei Cîşlariu, Silviu Vornicu, Carmen Brinzila...553
- 83 Experiments on the measurement of the electromagnetic field Voicu Viorica, Dina Livia Andreea, Dumbrava Ionel, Mircea Paul-Mihai, Ioan Fieraru...557
- Testing the Interaction of Electromagnetic Radiation with Nano/Micro-Conductive Composite
 Material Mihaela Aradoaei, Oliver Schreiner, Andreea-Maria Lucaci, Vlad Morosanu,
 Georgiana Patrascu, Adrian Saridache, Cristina Schreiner, Sebastian Aradoaei...563
- A Study of a Fractional Slot Concentrated Wound Permanent Magnet Synchronous Motor with Grain Oriented Electric Steel Lamination for Modular Stator Geometry - Bogdan Virlan, Adrian Munteanu, Alecsandru Simion, Leonard Livadaru, Ionut Nacu...569
- Control, Command and Regulation System Based on Virtual Instrumentation for Three-Phase
 Alternating High Current Source Gheorghe Eugen Subtirelu, Petre Pistol, Adrian Vintila,
 Mihaita Constantinescu...574
- Simulating The Interaction Of Electromagnetic Radiation With Matter, Within Nano/Micro-Conductive Composite - Mihaela Aradoaei, Oliver Schreiner, Ionel Alexa, Alin Olteanu, Madalina Ancuta Pintilei, Romeo Cristian, CiobanuSebastian Aradoaei...580
- Application of the Direct Power Control in a Three-Phase Shunt Active Power Filter System
 Mihaita-Daniel Constantinescu, Mihaela Popescu, Gheorghe-Eugen Subtirelu, Cosmin-Ionut
 Toma...586
- Application of SCADA System in an Electrical Substation and Remote Terminal Unit Parametrization Cosmin-Ionut Toma, Mihaela, Popesculon-Cristian Popa...592
- Numerical Solution of the Heat Conductance Equation Adelaida Mihaela Duinea, Felicia Elena Stan Ivan, Anca Petrisor...598
- Realisation of a low-cost three-axis CNC for processing soft materials Alexandru Palcu, Dumitru Dorin Lucache...604
- Synthesis of Agent-Based Decision-Making Systems with Multiple Coalitions Victor Ababii, Viorica Sudacevschi, Silvia Munteanu, Viorel Carbune, Radu Melnic, Victor Lasco...608