ANDREAS P. PANAYI

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PROFILE

Mechanical Engineer with three years of experience in internal combustion engine research: piston and piston ring dynamics, elastohydrodynamic lubrication, finite element methods and response surface methods.

EDUCATION

Ph.D., Mechanical Engineering **May 2009 (expected)**
Dissertation Title: The Dynamics of the Cylinder-kit Assembly of a Four Stroke Internal Combustion Engine
Chair: Dr. Harold J. Schock
Committee: Dr. Ronald Averill, Dr. Alejandro Diaz, Dr. Farhad Jaberi, Dr. Mikhail Ejakov (Ford Motor Company)
Michigan State University

M.Sc., Mechanical Engineering **May 2006**
Thesis Title: Piston Design and Analysis: Parameterized and Complete Finite Element Analysis Approach for the Assessment of Piston Performance
Michigan State University

B.Sc., Mechanical Engineering **May 2004**
Senior Project Title: Hot Wire Anemometry: A Hands-on Experience for the Mechanical Engineering Student
University of Vermont

Higher National Diploma, Mechanical Engineering **June 2000**
Diploma Project Title: A Multimedia Interactive Courseware Package on Internal Combustion Engines
Higher Technical Institute, Cyprus

RESEARCH EXPERIENCE

Research Assistant, Automotive Research Experiment Station, Michigan State University
May 2005 - Present

- Built a finite element analysis model tailored for the thermal and structural analyses of pistons. It takes the meshed piston geometry and returns its temperature and deformation distributions and the skirt compliance required to perform an elastohydrodynamic lubrication analysis.
- Proposed and developed a piston elastohydrodynamic lubrication analysis model that considers translation along the wrist-pin and second land interactions with the cylinder bore. Showed that translation along the wrist-pin becomes important when predicting piston wear.
- Developed and implemented a pseudo-adaptive response surface method for the optimization of piston skirt profiles. It is intended to be used in conjunction with computationally-intensive piston elastohydrodynamic lubrication analysis tools.
- Counseled and aided Mid Michigan Research, LLC, in the development of PISTON (elastohydrodynamic lubrication analysis tool), a module of the Cylinder-kit Analysis System for Engines (CASE).

INDUSTRIAL EXPERIENCE

Intern Research and Development Engineer, Mid Michigan Research (MMR), LLC, Okemos, Michigan
January 2008 – Present

- Researched and developed new simulation models (progressive wear, three-body wear) for MMR's RING (piston rings analysis tool), a module of CASE.

Intern Mechanical Engineer, Photos Photiades Breweries Ltd, Cyprus
March – June 2000

- Collaborated with the chief engineer to develop a preventive maintenance schedule for the factory machines.

INDUSTRIAL EXPERIENCE (CONTINUED)

Intern Mechanical Engineer, Cyprus Import Corporation (Mercedes-Benz), Cyprus
January – March 2000

- Assisted in the repair and maintenance service of Mercedes-Benz vehicles.

Intern Mechanical Engineer, General Army Staff, Thessalonica, Greece
June – August 1999

- Assisted in the rebuild of Detroit Diesel V8 two-stroke engines.

Intern Mechanical Engineer, Cyprus Petroleum Refinery Ltd, Cyprus
June – August 1998

- Familiarized with the equipment and operations of the plant (pumps, compressors, heat exchangers, control room).

TEACHING EXPERIENCE

Guest Lecturer for Automotive Engines course, Department of Mechanical Engineering, Michigan State University
Fall 2007

- Conducted a lecture on the challenges faced and the avenues followed by a research engineer in modeling the piston dynamics problem.

Graduate Assistant for Automotive Engines and Deformable Solids courses, Department of Mechanical Engineering, Michigan State University
Fall 2004, Spring 2005

- Led students to think and solve engineering problems during regular help sessions.
- Assessed and evaluated student learning outcomes.

Teaching Assistant for Introduction to Basic Mechanical and Electronic Systems laboratory, University of Vermont
Spring 2004

- Executed setup of the experimental apparatus and covered the introduction of the experiment.
- Answered questions the students encountered during the experiment.
- Assessed and evaluated student learning outcomes.

COMPUTER SKILLS

HyperMesh, HyperView, SolidWorks, ALGOR, COSMOS DesignStar, Ricardo WAVE, Fluent, Labview, CASE, Mathematica, MatLab, Fortran

SEMINARS ATTENDED

- Altair HyperMesh and Altair HyperView for FEA Pre and Post-Processing, Altair Engineering, Inc., Troy, Michigan, December 17-19, 2007
- Finite Element Analysis for Design Engineers - Hands-on FEA Workshop, SAE Seminar, Troy, Michigan, January 22-23, 2007
- Global Issues – Global Solutions, Fulbright Enrichment Seminar, Washington DC, March 2003
- Statistical Process Control, Higher Technical Institute, Nicosia, Cyprus, May 10-12, 1999

AFFILIATIONS

- American Society of Mechanical Engineers (ASME)
- Society of Automotive Engineers (SAE)
- Fulbright Association
- Toastmasters International

PROFFESIONAL SERVICE

Technical Session Co-chair, ASME Internal Combustion Engine Division Spring Technical Conference, 2008

- Administered the review process of six technical papers in the area of Engine Lubrication, Friction, and Component Design. This involved:
  - Assigning reviewers and assisting them in keeping to the publication schedule.
  - Determining acceptance of papers, once all review comments have been submitted.
  - Approving the author's final draft of the paper.

Member of the Advisory Committee, Department of Mechanical Engineering, Michigan State University, 2008

- Sole graduate student member, along with four faculty members.
- Counseled the Department Chairperson on major policy decisions affecting department personnel and the programs of the Department.

Technical Paper Reviewer

- Reviewed and assessed the quality for publication of seven technical papers based on my expertise in internal combustion engine modeling. These papers were presented at:
  - SAE World Congress, 2008
  - ASME International Mechanical Engineering Congress and Exposition, 2007
  - ASME Internal Combustion Engine Division Fall Technical Conference, 2007

PUBLICATIONS

- Panayi, A. P., Diaz, A. R., Schock, H. J., 2008, "On the Optimization of Piston Skirt Profiles using a Pseudo-Adaptive Response Surface Method", Structural and Multidisciplinary Optimization, (under review)
- Panayi, A. P., Schock, H. J., 2008, "On the Approximation of the Integral of the Asperity Height Distribution for the Greenwood-Tripp Asperity Contact Model," Proceedings of the IMechE Part J: Journal of Engineering Tribology, JET339, (to appear)
- Panayi, A. P., Schock, H. J., 2008, "Avenues for Predicting Piston Wear: Employing 2D and 3D Numerical Piston Dynamics Models", SAE Paper 2008-01-1044
- Panayi, A. P., Schock, H. J., 2007, "Investigations on Piston Secondary Dynamics: A Model that Considers Translation Along the Wrist-Pin and Second Land Interactions with the Cylinder Bore," ASME Proceedings of IMECE2007, Paper No. IMECE2007-41264
- Panayi, A. P., Schock, H. J., 2006, "Piston Finite Element Modeling for the Estimation of Hydrodynamic and Contact Forces and Moments," ASME Proceedings of ICEF2006, Paper No. ICEF2006-1587
- Panayi, A., Schock, H., Chui, B. K., Ejakov, M., 2006, "Parameterization and FEA Approach for the Assessment of Piston Characteristics," SAE Paper 2006-01-429

CONFERENCE PRESENTATIONS

- Panayi, A. P., Schock, H. J., "Avenues for Predicting Piston Wear: Employing 2D and 3D Numerical Piston Dynamics Models", SAE 2008 World Congress, Detroit, Michigan, April 14-17, 2008
- Panayi, A. P., Schock, H. J., "Investigations on Piston Secondary Dynamics: A Model that Considers Translation Along the Wrist-Pin and Second Land Interactions with the Cylinder Bore," 2007 ASME International Mechanical Engineering Congress and Exposition, Seattle, Washington, November 11-15, 2007
- Panayi, A. P., Schock, H. J., "Piston Finite Element Modeling for the Estimation of Hydrodynamic and Contact Forces and Moments," ASME Internal Combustion Engine Division 2006 Fall Technical Conference, Sacramento, California, November 5-8, 2006
- Panayi, A., Schock, H., Chui, B.K., Ejakov, M., 2006, "Parameterization and FEA Approach for the Assessment of Piston Characteristics," SAE 2006 World Congress, Detroit, Michigan, April 2-6, 2006
- Panayi, A., "The Costs of Downforce: the Effects of Angle of Attack of the Rear Wing of a Formula 1 Car on Downforce and Drag," Old Guard Oral Competition, ASME Regional Student Competition 2004, Region I, University of Vermont, Burlington, Vermont, April 1-3, 2004

RESEARCH INTERESTS

- Internal combustion engine modeling and design
- Piston and piston ring dynamics and tribology
- Finite element methods
- Optimization methods
- Computational fluid dynamics applied to airfoil flows for ground vehicles

HONORS/AWARDS

- Research Assistantship, Michigan State University, 2005-2008
- Graduate Assistantship, Michigan State University, 2004-2005
- Fulbright Scholar, 2002-2004
- Outstanding Senior Award in Energy Engineering, University of Vermont, 2004
- Second Place, Technical Web Contest; ASME Regional Student Competition 2004, Region I, 2004
- Inducted to the Order of the Engineer, 2004
- Inducted to Tau Beta Pi, 2003
- Universal Life Group Scholarship, Universal Life Group, Cyprus, 2002
- Best Diploma Project in Plant Engineering, Higher Technical Institute, Cyprus, 2000

LANGUAGE SKILLS

- Fluent in English and Greek.
- Rudimentary in Russian.

MILITARY EXPERIENCE

Communications Battalion, Ministry of Defense, Cyprus
July 2000 – July 2002

- Ranked to sergeant.
- Managed the company's guard shifts and personnel leave.
- Handled the company's supply office.