DAVID R. MUÑOZ

Interim Director & Associate Professor

CONTACT INFORMATION

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CAREER OBJECTIVE

To continue an effective career in research, teaching and leadership in the field of Mechanical Engineering. To engage in interdisciplinary efforts that can utilize my expertise toward achieving global sustainability.

EDUCATION

12/86	Purdue University, **Ph.D.** Ph.D. Thesis: Investigation of Entrainment in a Double-Diffusive Thermohaline System with Mixing Driven by Bottom Heating and Horizontal Recirculation.
8/83	Purdue University, **M.S.M.E.** M.S. Thesis: Conditions Within the Interfacial Boundary Layer of a Double-Diffusive Thermohaline System.
5/80	University of New Mexico, **B.S.M.E.** Project: Analysis of a Passively Heated Solar Home.

TECHNICAL ADMINISTRATIVE WORK EXPERIENCE

8/03-pres.	Interim Director, Division of Engineering, Colorado School of Mines.
1/02-7/03	Lead Technical Analyst, Colorado Intermountain Fixed Guideway Authority (CIFGA), established by Colorado statute to recommend alternatives to widening I-70 within the Colorado mountain corridor (~160 miles of interstate highway).
8/00-7/01	Assistant Director, Division of Engineering, Colorado School of Mines.

TEACHING WORK EXPERIENCE

7/94-6/95	Visiting Professor, Center for Manufacturing Research, Instituto Tecnologico de Estudios Superiores de Monterrey (ITESM) Monterrey, Nuevo Leon, MEXICO.
8/91-pres.	Associate Professor (with tenure) in the Engineering Division at the Colorado School of Mines (CSM).
1/87-8/91	Assistant Professor in the Engineering Department at the CSM.
8/86-12/86	Instructor in the Engineering Department at CSM.

Courses Taught

EGGN 233 Engineering Field Session
EGGN 312 Thermal Systems Design
EGGN 351 Fluid Mechanics I
EGGN 371 Thermodynamics I
EGGN 403 Thermodynamics II
EGGN 471 Heat Transfer
EGGN 473 Intermediate Fluid Mechanics
EGGN 475 Mechanical Projects Laboratory
EGGN 491/492 Engineering Capstone Design Sequence

Advised over 100 senior design projects. Examples include:

i. 1993 Ford/DOE and 1994 GM/DOE Hybrid Electric Vehicle Challenge (raised over $110,000 for the Ford Escort conversion)
ii. Formula SAE: a ground-up international racecar design competition (raise ~$10,000 per year for this project), 1996 - 2002.
iii. Coors Brewery: a project to measure the effectiveness of various frost alleviation techniques for refrigeration evaporators,
iv. Coors Brewery: developing a scheme to control the thermal stratification of cold thermal storage tanks.
v. National Park Service: Polyurethane foam closures of abandoned mine shafts.
vi. National Park Service: Sand Trap for acquiring direction and sand mass flux data on sand dunes.
vii. Colorado Advanced Materials Institute (CAMI): The development of an inexpensive health assessment package for 55-gallon drums of waste material. (PI on $45,000 CAMI grant.).
viii. Colorado Advanced Materials Institute (CAMI): Developing novel uses for used vehicle tires (PI on $45,000 CAMI grant).
ix. National Park Service: Advised students in the design of a small hydroelectric plant for the Yellowstone Park Headquarters. Currently working to secure funding ($300,000) to realize the project.
x. Holcim Cement (US), Design of materials handling system to displace kiln fuel (80,000 tons of coal per year) with carton waste (Portland Plant). (PI on a $92,000 grant).

EGES 503 Modern Engineering Design and Project Management

RESEARCH INTERESTS

Alternative Energy Systems
Energy Conservation,
Motivation and Leadership in Design Teams
More recently, my interests have turned to the broader issues related to
Global Sustainability

ENGINEERING RESEARCH EXPERIENCE

Engine Laboratory

Initiated the Colorado Center for Fuels and High Altitude Engine Research. The engine lab initiation cost is approximately $2,000,000.
-Co-PI on a proposal, funded by the Department of Energy, for $500,000 to be used for capital equipment and operating costs for the engine laboratory. I wrote the first draft of the proposal and sent it to DOE for initial evaluation.
-Spent six weeks during the summer of 1990 working at the EPA Motor Vehicle Emission Laboratories in Ann Arbor, MI to learn the details of testing for heavy-duty engine emissions. During this stay I located and secured the donation of a heavy-duty chassis dynamometer valued at $500,000.

Sponsored Research Projects

PI: “Air Turbulence Interaction with Fibers during Discontinuous Fiber Manufacturing”. This is an industry-university collaborative project, supported by the NSF under the GOALI program. The project is scheduled to last from October 1996 through September of 2000. Funded at $310,000 from NSF with $175,000 of in-kind support from Johns-Manville Corporation.

Co-PI: "Development of High Performance Refractory Fibers with Enhanced Insulating Properties and Longer Service Lifetimes", funded at $500,000, completed the Phase II report to the DOE. I advised a Ph.D. student in Materials Science who experimentally and numerically modeled the refractory fiber spinning/formation process.

PI: Initiator of the Slater Laboratory for Energy Conservation ($30,000/year for 5 years). Guided ten senior level students, in the Engineering Design (EG 412) course, through the design and fabrication of a low speed wind tunnel. The tunnel is currently being used in an undergraduate thermal design laboratory and to study the effects of stratified flows on the performance of building energy system heat exchangers. I am continuing these efforts through working with several groups of students in the EG Capstone Design course and independent study. One MS level graduate student has published the results of using the wind tunnel to model a single variable air volume (VAV) system to develop an optimal control algorithm, the objective of which is to conserve energy.

OTHER TECHNICAL WORK EXPERIENCE

1/02 –8/03 Technical analyst to the Colorado Intermountain Fixed Guideway Authority (CIFGA) on the 2002/03 US-DOT-FTA Urban Maglev Technology Development Grant ($4.2 Million). Analysis included:

i. GPS survey of the 170 mile long segment of I-70 between DIA and Eagle County Airport (in both directions),
ii. Electrical energy and transmission capabilities along the I-70 corridor,
iii. High-speed and docking switch design,
iv. Traveled to Japan, technically evaluated the Chubu HSST Maglev System for potential application in the I-70 mountain corridor, and
v. Performed a detailed winterization study.

7/93-96	Proficient at using FIDAP and FLUENT, a Computational Fluid Dynamics (CFD) code. Taught a 3-day short course in the use of FIDAP to professors at the Technological Institute in Monterrey, Mexico.
12/91-4/92	Proficient at the use of the ALGOR, a CFD and thermal analysis code.
3/86-8/86	Completed Ph.D. dissertation at Purdue University.
2/85-3/86	Visiting Professional at the **National Renewable Energy Laboratory** Performed research for the dissertation in absentia from Purdue at the Stratified Fluid Dynamics Laboratory.
8/84-12/84	Teaching Assistant at Purdue University. Taught in the undergraduate heat transfer laboratory.
8/83-7/84	Research Assistant Purdue University
	Research Summer Employee at **Argonne National Laboratory**
6/82-8/82	Developed instrumentation for the Research Salt Gradient Solar Pond.
6/81-8/81	Developed computer code for the Heat Utilization Group.
6/80-8/80	Reduced data and aided technicians in instrument calibration on the Steam Generator Test Facility.
	Engineering Co-op at **Lawrence Livermore Laboratory**
6/78-12/78	Solar Energy Research Group. Built a calorimeter type flow meter.
6/77-8/77	Oil Shale Research Group. Teamed with another staff member to design a large block retort.
6/76-12/76	Oil Shale Research Group

REFEREED PUBLICATIONS

Refereed Journal Articles

1. B.D. Tinianov, M. Nakagawa and D.R. Munoz, "An apparatus for in situ prediction of the thermal conductivity of glass fiber batts using acoustic propagation constant", in preparation, Review of Scientific Instruments, May 2005.
2. T.M. Padilla, T.P. Quinn, D.R. Munoz, R.A.L. Rorrer, and J.R. Berger, "Dynamic factors that influence GMAW push wire feeding performance: two predictive models compiled from three individual experiments," in preparation Welding Journal, 2005.
3. T.M. Padilla, T.P. Quinn, D.R. Munoz, R.A.L. Rorrer, and J.R. Berger, "Friction measurements at the wire-to-liner interface: The effect of buckling during GMAW wire-feeding", preparation Welding Journal, 2005.
4. T.M. Padilla, J.R. Berger, D.R. Munoz and T.P. Quinn, "An Inverse Solution Technique Using Full-field Photoelasticity and Flamant-Boussinesq Stress Distributions for Determining the Normal Contact Force during GMAW," in preparation for Experimental Mechanics, 2005.
5. T.M. Padilla, T.P. Quinn, D.R. Munoz and R.A.L. Rorrer, "A mathematical model of wire feeding mechanisms in GMAW," Welding Journal, 82(5): pp.100-109, 2003.

6. R. Nelson, M. Rivera, T. Babb, C. Callender, A. Giesick, R. Kopp, J. Lau, J. Moosebrugger, B. Morrison, J. Pfahl, S. Reece, D.R. Munoz and J.P.H. Steele, “Reduction in Emissions and Noise from a 500 cc Snowmobile”, SAE Paper No. 2000-01-2575, September, 2000.
7. R. Tresso and D.R. Munoz, "Homogeneous, Isotropic Flow in Grid Generated Turbulence", ASME J. Fluids Engineering, vol. 122, pp. 51-56, March, 2000.
8. R. Tresso and D.R. Munoz, "Measurement of Friction Drag Force on Discontinuous Glass and Polymer Fibers", Rev. Scientific Instruments, v. 71, no. 94, pp. 3587-3594, September, 2000.
9. H. Li, C. Ganesh and D.R. Munoz, “Optimal Control of Duct Pressure in HVAC Systems”, ASHRAE Transactions, vol. 102, no. 2, ASHRAE Atlanta GA USA, pp. 170-174, 1996.
10. Y. Cai, D.R. Munoz, G. DePoorter and P. Martin, Modeling Fiber Formation by the Spinning Process, ASME FED - Vol. 206/AMD-Vol. 191, Developments in Non-Newtonian Flows, 1994.
11. C.G. Braun, G.W. Schlesier and D.R. Munoz, Colorado School of Mines Hybrid Electric Vehicle “Drive to the Future”, 1994 Hybrid Electric Vehicle Challenge (SP-1103), Society of Automotive Engineers, 1994.
12. C.G. Braun and D.R. Munoz, "Colorado School of Mines Entry into the Ford Hybrid Electric Vehicle Challenge", Innovations in Design: 1993 Ford Hybrid Electric Vehicle Challenge (SP-980), Society of Automotive Engineers, 1993.
13. D.R. Munoz, F. Zangrando, R. Viskanta and F.P. Incropera, "Gradient Layer Entrainment Correlation for a Salt Gradient Solar Pond with Storage Layer Recirculation," ASME J. Solar Energy Eng., vol. 110, no. 4, 1988.
14. J.F. Atkinson and D.R. Munoz, "A Diffusive Limit for Entrainment," J. Hydraulic Res., International Association Hydraulics Research (IAHR), vol. 26, no. 2, 1988.
15. T.L. Bergman, D.R. Munoz, F.P. Incropera, and R. Viskanta, "Measurement of Salinity Distributions in Salt-Stratified, Double-Diffusive Systems by Optical Delfectometry," Rev. Sci. Instrum., vol. 57, no 10, October, 1986.
16. T.L. Bergman, D.R. Munoz, F.P. Incropera, and R. Viskanta, "Correlation for the Entrainment of a Salt-Stratified Fluid by a Thermally Driven Mixed Layer," ASME paper 83-WA/HT-76, 1983.

Refereed Conference Papers

1. C. Skokan, D. Munoz and J. Gosink, C., “Humanitarian Projects in Multidisciplinary Senior Design”, ICEE Conference, Gliwice, Poland, July 25-29, 2005.
2. E. H. Bauer, B. M. Moskal, J.P. Gosink, J.C. Lucena and D.R. Munoz, “Understanding Student and Faculty Attitudes with Respect to Service Learning: Lessons from the Humanitarian Engineering Project”, Proceedings of the 2005 ASEE Annual Conference and Exposition, Portland, OR, June, 2005.
3. 2. T.M. Padilla, J.R. Berger, D.R. Munoz, T.P. Quinn, and R.A.L. Rorrer, “Contact Models of GMAW Wire Liner Friction: An Inverse Photoelastic Solution”,

Proceedings of the 85th AWS International Exposition and Annual Convention, McCormick Place, Chicago, IL, April 5-9, 2004.

4. 4. T.M. Padilla, T.P. Quinn, D.R. Munoz and R.A.L. Rorrer. “A Mathematical Model of Wire Feeding Mechanisms in Gas Metal Arc Welding”, American Society of Metals International Conference, Pine Mountain Georgia, April 2002.
5. 5. T.M. Padilla, T.P. Quinn and D.R. Munoz, “Tribological Modeling of Aluminum and Steel Weld Wire in Gas Metal Arc Welding”, 3rd Place Award for Poster Competition, AWS MAX International Exposition, May 2001.
6. 6. T.M. Padilla, T.P.Quinn and D.R. Munoz, “A Static and Dynamic Analysis of Wire Feeding Mechanisms in Aluminum Gas Metal Arc Welding”, technical paper SES 37th Annual Technical Meeting, University of South Carolina, October 2000.
7. R. Tresso, J.P. Delplanque and D.R. Munoz, “Numerical Model of Discontinuous Glass Fiber Spinning”, Presented at the American Ceramic Society Symposium on Glass Melting and Forming Processes, Indianapolis, April, 2001.
8. 8. M. Linne and D.R. Munoz, “Thermal Systems Design at the Junior Level”, presented at the 1994 ASEE/IEEE Frontiers in Education Conference, 1994.
9. 9. G. Depoorter, D.R. Munoz, Y.Cai, P. Martin, "Thickness Shrinkage Modeling for Refractory Fiber Blankets”, Presented at the Am. Ceramic Soc. 95th Ann. Meeting and Exposition, April, 1993.
10. 10. F. Zangrando, D. Munoz and H. Johnstone, "Entrainment Conditions at the Lower Interface in a Solar Pond," Proceedings for the Conference, International Progress in Solar Ponds, Cuernavaca, Morelos, Mexico, March 29-April 3, 1987.

Refereed Technical Reports

1. “Urban Maglev Technology Development Program, Colorado Maglev Project”, Report to the Federal Transit Administration, USDOT, FTA-CO-26-7002-2004, June 2004. http://www.dot.state.co.us/publications/maglev/maglev.htm

2. Y. Cai, J.M. Curtis, G.L. DePoorter, P.C. Martin and D.R. Munoz, “Development of High Performance Refractory Fibers with Enhanced Insulating Properties and Longer Service Lifetimes”, Phase I Interim Report, Improved Refractory Fiber and Industrial Benefit Development, Under Cooperative Agreement DE-FC07-89ID12880 with the U.S. Department of Energy and Schuller International Corporation, May 1993.

3.Y. Cai, J.M. Curtis, G.L. DePoorter, P.C. Martin and D.R. Munoz, “Development of High Performance Refractory Fibers with Enhanced Insulating Properties and Longer Service Lifetimes”, Phase II Final Report, Improved Refractory Fiber and Industrial Benefit Development, Under Cooperative Agreement DE-FC07-89ID12880 with the U.S. Department of Energy and Schuller International Corporation, May 1995.

4. D. Munoz and F. Zangrando, "Mixing in a Double Diffusive, Partially Stratified Fluid," SERI Report TR-252-2942, July 1986.

Posters

1. E. Allen, D. Munoz and R. Delgado, Investigation of appropriate water and waste management technologies for cities within developing countries; application to Villanueva, Honduras, to be presented in Berlin, Germany, May 26 – June 3, 2005.

2. T.M. Padilla, T.P. Quinn, D.R. Munoz, R.A.L. Rorrer, and J.R. Berger, "Friction conditions during GMAW wire feeding," Poster: AWS Robotic Arc Welding Conference, Grosvenor Resort, Orlando FL, Feb. 9-10, 2004.
3. D.R. Munoz and C. Skokan, "Observations in Leadership and Motivation in Senior Design", ASEE Engineering Education Congress, Albuquerque, NM, June 2001.
4. T.M. Padilla, T.P. Quinn and D.R. Munoz, "Tribological Modeling of Aluminum and Steel Weld Wire in Gas Metal Arc Welding", 3rd Place Award for Poster Competition, *AWS MAX International Exposition*, May 2001.
5. D. Munoz, Air Turbulence Interaction with Fibers during Discontinuous Fiber Manufacturing I, NSF Grantees Conference, Seattle, WA, Jan 1997.
6. D. Munoz, Air Turbulence Interaction with Fibers during Discontinuous Fiber Manufacturing II, NSF Grantees Conference, Monterrey, Mexico, Jan 1998.
7. D. Munoz, Air Turbulence Interaction with Fibers during Discontinuous Fiber Manufacturing III, NSF Grantees Conference, Long Beach, CA, Jan 1999.

AWARDS AND HONORS

-Mondialogo Engineering Award**,** May 2005, one of 21 globally.
-SAE Faculty Advisor Award, March 1999, one of 10 nationally.
-Associate Technical Editor ASME Journal of Solar Energy Engineering, Solar Ponds and OTEC, Fall 1992 - Fall 1996.
-SAE Ralph R. Teetor Award for Educators, February, 1990, one of 16 nationally.
-Voted Outstanding Faculty Member in the Engineering Department 1988-89 by the CSM Engineering Student Advisory Committee (EDSAC).
-Outstanding Faculty Award from the December 1989 CSM Graduating Class.

REFERENCES

Available upon request