

JULIO C. CASTRO

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PROFESSIONAL GOAL

Seeking a position in a research and development environment, specifically in the area of particle technology, particle design, and/or bulk powder flow.

WORK EXPERIENCE

Research Assistant, January 2003 to August 2008

Particle Engineering Research Center, Gainesville, FL

Built a polariscope system to measure stresses in a photoelastic material with very low Young's modulus. Tested spherical glass beads in a Jenike shear cell and a Schulze ring tester in order to measure mechanical properties such as wall friction, internal friction angle, and flow function. The wall friction angle was measured using various metal structures commonly found in silos. Measured particle size distribution of spherical glassbeads using light scattering methods (Coulter LS13000). Used Discrete Element Modeling (DEM) to simulate the wall friction test in the Jenike cell, PFC2D from Itasca was used as environment for these simulations, results were compared to experiments and a good match was found. These results were presented in the World Congress in Particle Technology in 2006 in Orlando, FL. Developed a C++ code for particle contact models for the DEM simulations. Supervised undergraduate students doing research and relevant experiments for the project. Developed a 3D DEM (again, using PFC3D from Itasca) model of a ring shear tester, to determine the influence of inter-particle friction on the internal friction angle.

Research Assistant, August 2000 to December 2002

University of Florida, Gainesville, FL

Designed MEMS-based shear stress sensor for fluid flow applications. The design involved a mechanical analysis (large and small deformation of beams) of forces on sensor and a dynamic response under the expected loads. Fabricated sensors using chemical wet etching. Fabricated Aluminum gratings using photolithography, ion beam deposition, and chemical wet etching. Designed and implemented optical test bench for MEMS sensor. Calibration and testing of an infrared laser beam and a CCD camera. Measured stresses using Moiré interferometry techniques. Data acquisition of sensor using Labview; images were loaded into a Matlab program for further processing and measurement analysis. Developed a FEA model for the MEMS sensor using Abaqus, the model was used to analyzed the stresses in the floating element of the sensor due to the action of loads.

Metrologist, April 1996 to August 2000

Centro de Investigacion Cientifica de Yucatan (CICY), Merida, Yucatán, Mexico

Developed calibration procedures of temperature instruments, reviewed calibration procedures of weighing and volume measurement instruments. Documented and developed the quality system of a metrology laboratory based on ISO 9000 standards. Generated humidity and temperature characterization of calibration laboratories. Worked, together with the lab team and the lab leader, towards the certification of the metrology laboratory. Worked on the corrections from the certification process, along with my coworkers and directed by the lab leader. Obtained certification as a calibration engineer of weighing devices and weights.

Research Assistant, September 1995 to April 1996

Centro de Investigacion Cientifica de Yucatan (CICY), Merida, Yucatan, Mexico

Processed different composite formulations in a double-rotary blender in order to find the best formulation for a hydrocarbon sensor. Tested different small scale fabrication processes of the composite material, with these results a full-scale fabrication process was designed for mass production of this sensor. Designed experiments directed towards studying the dispersion of carbon black in hydrocarbons.

EDUCATION

M.S., Engineering Mechanics, July 2003
University of Florida, Gainesville, FL

B.S., Mechanical Engineering, July 1995
Instituto Tecnológico de Merida, Merida, Yucatan, Mexico

References available on request.