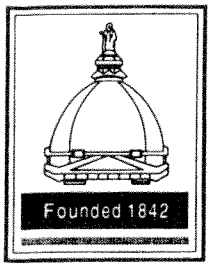
AEROSPACE & MECHANICAL ENGINEERING



2010 COLLOQUIUM 2011

SEMINARS ARE OPEN TO THE PUBLIC

INFORMAL COFFEE PERIOD BEFORE THE SEMINAR IN ROOM 365 FITZPATRICK HALL

UNIVERSITY OF NOTRE DAME, NOTRE DAME, INDIANA 46556

SPEAKER: **Professor Jiun-Shyan Chen**
Chair, Civil & Environmental Engineering Department
University of California, Los Angeles (UCLA)
Los Angeles, California

TOPIC: **STABILIZED AND REGULARIZED MESHFREE METHOD AND ITS APPLICATION TO FRAGMENT-IMPACT PROBLEMS**

DATE: Tuesday, April 19, 2011

TIME: 3:30 p.m.

PLACE: 138 DeBartolo Hall

ABSTRACT

Domain integration of weak form poses considerable complexity in Galerkin meshfree method. Employment of Gauss quadrature rules yields integration errors when background grids do not coincide with the covers of shape functions. Direct nodal integration, on the other hand, results in rank instability. We show how to construct stabilization of nodal integration to achieve consistency, stability, and convergence under Galerkin meshfree framework. Further, spurious low energy modes exist in some stabilization methods and they could be excited under certain conditions. In this work, we also introduce stabilization of spurious low energy modes for general large deformation problems. Approximations used in meshfree methods, such as moving least square and reproducing kernel approximations, possess intrinsic nonlocal properties. These nonlocal properties of reproducing kernel approximation are exploited to incorporate an intrinsic length scale which regularizes problems with material instabilities in strain localizations. We also introduce approximation and domain integration approaches to yield a gradient type regularization to the localization problems. For modeling fragment-impact problems, we further propose a kernel contact algorithm for multi-body contact where the contact surfaces are not known *a priori*. Several fragment-impact and penetration problems are given to examine the effectiveness of the proposed methods.

NOTE: ***If you are interested in meeting individually with Prof. Chen, please contact Evelyn at 631-5431***