



DEPARTMENT OF MECHANICAL ENGINEERING Purdue School of Engineering and Technology

FALL 2005 SEMINAR SERIES

Date: **Monday, November 28, 2005**

Time: **8:30 am - 10:00 am**

Room: **ET 137**

Everyone is invited

Parallel Computing of Fluid Structure Interactions Problems

(Thesis Defense)

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Abstract. A mesh based parallel code coupling search and interpolation program SINEDA was developed to couple the Computational Fluid Dynamics (CFD) solver and the Computational Structural Dynamics (CSD) solver for prediction of aerodynamic flutter. Multiple programs Multiple Data (MPMD) paradigm of parallel computing was incorporated enabling the transfer of coupling quantities between a parallel CFD solver and serial structure solver. Alternating digital tree (ADT) geometric search algorithm was used for establishing the remote mesh node and local mesh element pairs. Then bilinear interpolations are used for accurate transfer of coupling quantities across the dissimilar meshes. The loosely coupled solver FSIEDA, which consists of CFD solver FAPEDA, CSD solver SAPEDA and the search and interpolation program SINEDA, was utilized for prediction of aerodynamic flutter stability boundary for the AGARD 445.6 aeroelastic wing and the ONERA M6 wing. Local preconditioning formulation of the time derivative term was developed for the current unsteady Euler solver for solution of moving boundary problems. The Dual time stepping strategy was employed for maintaining the time accuracy of the flow solver.

About the Speaker. Amit Baddi obtained his Bachelor of Mechanical Engineering from University of Pune 2001. He was a research assistant in the Department of Mechanical Engineering, IUPUI, working in the areas of Computational Fluid Dynamics, Fluid-Structure Interactions and Parallel Computing. His thesis advisors are Prof. Hasan Akay (major advisor), Prof. Akin Ecer and Prof. Andrew Hsu. He is currently working as a Structural analysis engineer at Cummins Inc.