

CALIFORNIA STATE UNIVERSITY, LONG BEACH

THE MATHEMATICS COLLOQUIUM

presents

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speaking on

Gamma Guidance for the Inertial Upper Stage

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12:00PM-1:00PM

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Abstract: The Inertial Upper Stage (IUS) is a multi-stage solid-rocket-motor vehicle designed to transfer payloads from a near Earth parking orbit to a variety of high Earth orbits and interplanetary trajectories. Gamma Guidance is an explicit onboard guidance algorithm for the IUS.

The IUS guidance problem consists of determining the orbit transfer maneuvers with a combination of solid-rocket-motor and vernier burns to place the payload into the required mission orbit with an onboard, autonomous, real-time algorithm. This differs from the guidance problem for liquid rocket motors in that the maneuvers must match the fixed energy available from the solid-rocket-motors. Modern control theory methods of a state space formulation and linear mathematical techniques are used to solve the IUS guidance problem. In particular, a solution was found to the two-point boundary-value problem in ordinary differential equations.