

**Meeting:** 1003, Atlanta, Georgia, MAA CP J1, MAA Session on Projects and Demonstrations that Enhance a Differential Equations Course, I

1003-J1-1165      **Mark McKinzie\*** (mmckinzie@sjfc.edu), Dept of Mathematical and Computing Sciences, St. John Fisher College, 3690 East Ave., Rochester, NY 14618. *Foam insulation, wind resistance, and the Space Shuttle.*

On January 16, 2003, during its ascent to orbit, a piece of foam insulation broke free of the external fuel tank of the Space Shuttle Columbia, decelerated due to atmospheric drag, and collided with the wing of the orbiter. In this project, students explore the dynamics of the foam debris after it has broken from the fuel tank, determining the elapsed time until collision, predicting the relative speed at impact, and the ensuing force incident to the wing of the orbiter. By modifying various parameters in the problem, students extend the mathematical model to analyze the feasibility of using an ejection-seat style crew escape system in various stages of flight. Exact, qualitative, and numerical methods come to bear on various aspects of this project. (Received October 04, 2004)