You are cordially invited to attend this technical talk co-sponsored by the National Institute of Aerospace and the AIAA Hampton Roads Section. The talk is part of the AuRA lecture series. If you would like to arrange a meeting with Mr. Zick, please contact Kurt Severance at 864-6715 or kurt.severance@nasa.gov.

Directions to the NIA can be found at http://www.nianet.org/visitingnia/
This lecture is free and open to the public.

"A Swarm of Wind-Driven Mars Rovers: Adaptive Exploration and Assembly"
Kenneth Zick
University of Michigan

10:00am December 16, 2005
National Institute of Aerospace
100 Exploration Way, Room 137
Hampton, VA

We present an architecture for an autonomous swarm of wind-driven Mars Tumbleweed rovers. Rover mobility arises from shifting environmental forces and a Stop/Go control mechanism; neither a steering capability nor a means of propulsion is required. The swarm implements a hybrid agent architecture which allows the rovers to adapt to local wind regularities and communicate over a mesh network. Despite the limited motion control, the swarm is capable of collective exploration of unknown terrain while balancing cohesion, dispersion, and spatio-temporal coverage. The swarm architecture allows assembly of ad hoc teams at sites of interest; each assembly includes a complete set of instruments for collective analysis. A method of dynamically selecting behavioral roles allows improved opportunities for team assembly. The swarm exhibits robustness to individual failures of mobility and/or communications. We will demonstrate our simulation model and present preliminary results.

Mr. Zick is a doctoral student at the University of Michigan studying Computer Science & Engineering (starting January 2006), and a member of the Center for the Study of Complex Systems. His research interest is the engineering of adaptive systems, with a focus on Intelligent Systems for space applications. His background is in hardware engineering and chip design, with 12 years of experience at IBM, Cyrix, and Motorola. He has a bachelor's degree in Electrical Engineering from the University of Michigan and a Master's in Electrical Engineering from the University of Texas at Dallas. Mr. Zick is also interested in multi-agent systems, swarm intelligence, machine learning, evolutionary computation, robustness, and resiliency. He is a member of the American Institute of Aeronautics and Astronautics. For more information please see www.ComplexityBlog.com.