**NASA SBIR 2005 Phase I Solicitation**

**O2.01  Automated Optical Tracking and Identification of 3D Tumbling Objects**

Lead Center: KSC

Participating Center(s): GSFC

**Automated Optical Tracking**
Develop a fully automated optical tracking system using data from multiple tracking stations located in and around the spaceport to provide accurate real-time trajectory and range data on space-lift vehicles for as long as possible following launch. The necessary optical tracking algorithms will be developed and modeled, with an emphasis on a robust automated tracking capability in the presence of smoke, clouds, or haze. The camera locations may be either land or sea based, or mounted on aerial vehicles, or some combination of all three. The initial investigation will determine the maximum downrange tracking distance, the tracking errors as a function of downrange distance, the processing speed, and the means for transmitting analyzed data to the command center.

**Tracking and Identification of 3D Tumbling Objects**
Develop techniques to track and construct 3-dimensional views of tumbling objects in the atmosphere or space using digital optical tracking images for a variety of missions. These views will be used to determine the objects' approximate geometric sizes and shapes. The potential application is to help track and identify debris quickly after an accident or flight anomaly. The data will be provided by sequential digital images from one or more tracking cameras, ideally operating autonomously. The goal is to track and identify between 50 to 100 objects with typical cross-sections varying from tens of square meters down to one square meter or less within several minutes after an accident. The initial investigation will determine the minimum size that can be imaged using current technology, the probability of correctly estimating an object's size and shape, the processing speed, and the means for transmitting analyzed data to the command center.