



NASA SBIR 2011 Phase I Solicitation

A1.09 Integrated Vehicle Dynamics Modeling Methods for LOC Conditions

Lead Center: LaRC

Participating Center(s): ARC, GRC

Effective characterization of LOC conditions requires inclusion of the flight dynamics effects from multiple disciplines, including aerodynamics, structures, propulsion, and aeroelasticity. However, the types of data and data sets obtained from modeling in these various disciplines can be quite disparate, even within a discipline (e.g., wind-tunnel static versus dynamic data versus CFD flow-field data), and is exacerbated when we consider the non-linear parts of the flight envelope. Further, disciplines have varying levels of sensitivity to certain flight conditions.

Of interest are software tools that could take such disparate types of information and provide methods to manage and integrate them in a single environment to provide flight-dynamics-relevant implications. Examples include translating thrust response into force and moment increments to superimpose on the nominal aerodynamics, or applying aerodynamic load distributions to key structural components to define flight envelope boundaries based on structural load limits. Such tools can also be useful in highlighting flight conditions where data sets overlap and thus may provide good integrated model fidelity, versus conditions where fidelity may be limited, helping provide guidance on where research emphasis should be placed. Overall, concepts should be aimed at facilitating integrated model implementation into a flight simulation environment.