

NUMERICAL SOLUTION OF AEROELASTIC PROBLEM IN UNSTEADY MOTION OF PARACHUTE SYSTEM

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Abstract

This paper presents the mathematical description and numerical solution of parachute interaction with medium during system motion along its trajectory with the help of equations of ballistics, canopy form shaping, material elasticity and aerodynamics. This motion is considered as three correlated processes. The first process is the motion of capsule under the influence of gravity, drag and stretching force of suspension lines. The second process is the motion of free vortices behind the canopy, and the third one is the motion of suspension lines and penetrable canopy elements with connected attached vortices. The presented algorithm couples the Finite Element Method with Discrete Vortex Method and uses the Method of Temporal Layers for system solution. This solution takes into consideration specific features of system, such as flow instability, turbulent wake, unstable and flexible canopy and its porosity. Several examples illustrate its wide latitude in applied problems.