

## **Nonlinear Flight Simulator of a Canard-Guided Spin-Stabilized Projectile**

This article proposes a methodology for obtaining a guidance & control loop which is a part of a nonlinear simulation environment used for evaluating the performance properties of a 155mm canard-guided spin-stabilized artillery smart munition. The role of each of the different elements of the loop, their features and the challenging constraints to be considered in order to obtain these elements, are addressed. The procedure is mainly focused on the design of a high performance and robust skid-to-turn autopilot, which is divided in three sections. The first section concerns both the development of a nonlinear mathematical model describing the projectile roll/pitch/yaw-channels behavior along with the obtainment of the linearized dynamics necessary for autopilot design which is treated in the second section. Finally, the third section presents nonlinear 7DoF trajectory simulation results.