

GNC for proximity operations around a non-cooperative space object

The non-cooperative rendezvous operations in space that are involved in the capture and removal of orbital debris bring a new class of GNC challenges. The main purpose of this study is to focus on some of the control issues. The work consists in characterizing a relatively new control technique (Model Predictive Control or MPC) applied to space rendezvous operations. After a description and preliminary analyses of the selected MPC technique, an evaluation of the control behavior is performed through realistic closed-loop simulations that include a full navigation function built with a Lidar model, 3D image processing algorithms and a Kalman based state estimator. The potential benefits of this MPC technique are assessed and improvement options are proposed.