DIGITAL AUTOPILOT FOR INDIAN REUSABLE LAUNCH VEHICLE

Gopal Jee, Kapil Kumar Sharma, K. Koteswara Rao, Anish Antony, N. Soumya, Asha P. Nair, Govardhana Reddy, Rajib Shekhar Pal, Ramesh Mettu, K.S. Mansoor, J. Jayabalan, V. Brinda, D.S. Sheela, V.R. Lalithambika, M.V. Dhekane
Vikram Sarabhai Space Centre (VSSC)
Department of Space, ISRO Post
Thiruvananthapuram-695 022, India
Email : gopal_jee@vssc.gov.in

Abstract

Indian Space Research Organization (ISRO) has forayed into the development of reusable launch vehicle with the launch of a Two-Stage-To-Orbit (TSTO) vehicle. RLV-TD (Reusable Launch Vehicle Technology Demonstrator) is a double delta wing-body with twin vertical tail TDV (Technology Demonstrator Vehicle) which is boosted to hypersonic velocity using solid rocket booster and has a controlled descent from 70km altitude using Reaction Control System (RCS) and aero control surfaces. A novel control law was developed for the whole vehicle by the fusion of experiences imbibed through control law development for launch vehicles and existing design methodologies adopted for conventional aircrafts. Simulation studies (Six Degree of freedom) played a vital role in the design phase of autopilot, through which the design is validated, addressed several concerns and helped to finalize the autopilot design. Simulation studies brought out the issues associated with ascent and descent phases, and control law was adapted to mitigate all the difficulties. This paper gives an insight into the various design and simulation aspects of digital autopilot developed for RLV-TD.

Keywords: Digital Autopilot, Attitude Control, Stability, Longitudinal/Lateral Dynamics