

Guidance & Control for Indian Missile Systems

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Abstract: The technology of guided missiles encompasses the multiple streams of engineering, technology and applied sciences. Many successful missions depend upon a number of factors - aerodynamics, propulsion, and so on. The missiles developed by DRDO needs: boost-phase interception of ballistic missiles, discrimination-coupled guidance for midcourse intercepts, terminal guidance, Kill Vehicle engineering, integrated guidance control, and rapid prototyping of GNC algorithms and hardware. These guidance technologies can generally be divided up into two broadly categories being "active," "passive" and "semi-active" guidance.

The purpose of the guidance and control law is to determine appropriate missile flight path dynamics to achieve mission objective in an efficient manner based on navigation information. A variety of schemes, based on type of on-board guidance systems – inertial, SatNav, seekers, radar updates, scene correlation etc., are developed for higher lethality.

Hardware-in-loop Simulation (HILS) facilities and methodology form a well-integrated system aimed at transforming a preliminary guidance and control system design to flight software and hardware with trajectory right from lift-off till its impact. Various guidance and control law studies pertaining to gathering basket and stability margins, pre-flight, post-flight analyses and validation of support systems have been carried out using this methodology.

The present talk deals with variety of control and guidance schemes and modern mechanisms and emphasises the need for optimal laws for Missiles and Guided Bombs.



Bio sketch of the speaker: Dr Satheesh Reddy is one of the renowned experts in Navigation and Avionics technologies. He joined DRDO in 1986 and led the Conceptualization, Design, Development and Production of Inertial Sensors, Navigation schemes, Algorithms & Systems, Calibration methodologies, Sensor Models, Simulation along with development of Satellite Navigation Receivers and Hybrid Navigation Systems, to name a few. Under his leadership, advanced products and varieties of Avionics systems have been produced and successfully flight tested in strategic programs of the country.

Dr Reddy graduated in Electronics and Communication Engineering from JNTU, Anantapur and received his MS & Doctorate from JNTU, Hyderabad. He is a Fellow of various Academies and Institutes like the Indian National Academy of Engineering, Royal Institute of Navigation London, Royal Aeronautical Society London and a Senior Member of many other professional/scientific bodies in the country and abroad. He has been awarded Full Member Diploma and inducted as a Foreign Member of the Academy of Navigation & Motion Control, Russia and is an Associate Fellow of American Institute of Aeronautics & Astronautics, USA (AFAIAA). In recognition of his distinguished contributions, Computer Society of India conferred on him the Honorary Fellowship (HFCSI). He is also an Honorary Member of ACDOS.

Dr Reddy is a recipient of several prestigious awards which includes the Indian Science Congress Association Homi J. Bhabha Memorial Award, DRDO Young Scientist Award, Agni Award for Excellence in Self Reliance, DRDO Scientist of the Year Award etc. He is a Member of the Governing Council/Academic Senate of reputed academic institutes.