

## **Title: Role of Structural Optimization in Aerospace Mechanisms Design**

### **Abstract:**

The design problems in most of the cases may have single or multiple objectives and a set of constraints to be satisfied. Finding the best solution calls for exploration of design space defined by bounds on design variables and the constraints. Optimization is a technique which gives the opportunity to explore the design space exhaustively and helps in achieving the best possible design with minimum design iterations.

Design of aerospace structures and mechanisms are subjected to multiple challenges such as stringent constraints, mass budgets, frequency constraints, minimum buckling load factor requirements, etc. Structural optimization helps in achieving all such requirements for a given set of constraints. It mainly consists of Topology, Shape and Size or parametric optimization.

In conventional design of structures, a material distribution is assumed, analysed, hardware realised and tested. Based on these, material distribution is modified and verified again. This kind of conventional design is iterative and time consuming. To overcome this, optimization problems are solved to achieve the desired objective while meeting the design constraints. Topology optimization is a methodology for designing a mechanical system to get an optimal material distribution (or lay-out). Shape optimization helps in obtaining the optimum shape of the pockets whereas Size / parametric optimization helps in achieving optimum parameters of the structure. These techniques if judiciously used ensures smarter and faster product development.

### **Brief biodata**

Pakeeruraju Podugu, Scientist F is heading Mechanism Design and Simulation Division (MDSD) of Defence Research & Development Laboratory (DRDL), Hyderabad. He completed his B. Tech. in Mechanical Engg. from National Institute of Technology - Warangal and M.E. from Indian Institute of Science - Bengaluru in the area of Structural Optimization. His areas of expertise are Mechanism Design, Multi Body Dynamic (MBD) simulation, Structural Design and Optimization. He has around twenty paper publications in national and international conferences. He has made significant contributions towards critical subsystems of aerospace vehicles.