

## Dynamic Reliability Based Structural Optimization

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### **Abstract:**

Structural dimension and shape optimization based on the structural dynamic reliability is investigated in this paper. Structural gross mass is taken as the objective function and the element/system dynamic reliability is incorporated into the constraints. The dynamic reliability constraints are transferred and simplified, and the normalization of design variables is discussed to avoid some variables being drowned by others during optimization due to their different dimensions and orders of magnitude. The optimal models of dimension and shape with element or system dynamic reliability constraints are then presented. Numerical examples are used to illustrate the results of different optimal designs, which demonstrate that the efficiency to solve the structural optimization with dynamic reliability constraints can be significantly improved if the design variables and their initial values are selected properly.

**Key words:** Dimension and shape optimization, normalization of design variables, dynamic reliability constraints.