

Optimal Analysis of Structures by Large Wing Panel Using FEM

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Abstract : In this study, induced structural optimization is performed to compare the trade-off between wing weight and induced drag for wing panel extensions, construction of wing panel and winglets. The aerostructural optimization problem consists of parameters with strength condition, and two maneuver conditions using residual stresses in panel production. The results of kinematic motion analysis presented a homogenization based theory for 3D beams and 3D shells for wing panel. This theory uses a kinematic description of the beam based on normalized displacement moments. The displacement of the wing is a significant design consideration as large deflections lead to large stresses and increased fatigue of components cause residual stresses. The stresses in the wing panel are small compared to the yield stress of aluminum alloy. This study describes the implementation of a large wing panel, aerostructural analysis and structural parameters optimization framework that couples a three-dimensional panel method.

Keywords : wing panel, aerostructural optimization, FEM, structural analysis

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