Advances in Aircraft Structures

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Effect of Boundary Conditions on the Buckling Behavior of Perforated Plates

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Abstract

The effect of aspect ratio, the size of the hole and the boundary conditions on the buckling load of a perforated plate are studied in this chapter. The support conditions were varied with having a constant aspect ratio and hole size. The results are presented in graphical form.

Keywords: *Buckling, plates, ANSYS, cutouts, critical load.*

1. Introduction

Thin steel plate elements constitute very important structural components in many structures, such as ship grillages and hulls, dock gates, plate and box girders of bridges, platforms of offshore structures, and structures used in aerospace industries. In many cases, these plates are subjected to axial compressive forces which make them prone to instability or buckling. If the plate is slender, the buckling is elastic. However, if the plate is sturdy, it buckles in the plastic range causing the so-called inelastic (or elasto-plastic) buckling.

In aerospace design, the structural buckling should be taken into consideration so that the design can withstand a heavy load during flight. Buckling can occurs at