

Accepted Manuscript

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PII: S0142-1123(18)30208-1
DOI: <https://doi.org/10.1016/j.ijfatigue.2018.05.022>
Reference: IJF 4694

To appear in: *International Journal of Fatigue*

Received Date: 18 January 2018
Revised Date: 5 May 2018
Accepted Date: 21 May 2018



Please cite this article as: Boljanović, S., Computational modeling of aircraft lugs failure under fatigue loading, *International Journal of Fatigue* (2018), doi: <https://doi.org/10.1016/j.ijfatigue.2018.05.022>

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Computational modeling of aircraft lugs failure under fatigue loading

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Abstract

In the present paper, a computational model of failure is developed to assess the fatigue behaviour of damaged aircraft lugs. In such a fracture mechanics-based analytical/numerical research work, the residual strength of lugs with either a through-the-thickness crack or a quarter-elliptical corner crack is estimated, and then, through the experimental observations found in the literature, some applications are discussed. A stress field of pin-loaded linkage is numerically analyzed by using the finite element method. The failure resistance of lugs is quantified through the Huang-Moan crack growth concept in terms of fatigue life and crack path. The relevant crack driving forces are examined through a new analytical model, taking into account the effect of a lug head and the width-to-diameter ratio effect.

Keywords: Aircraft lug, Fatigue strength, FEM, Quarter-elliptical/through cracks, Crack path

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