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# Continuum damage mechanics based approach to study the effects of the scarf angle, surface friction and clamping force over the fatigue life of scarf bolted joints

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Abstract: In this study, an approach based on continuum damage mechanics is applied to the fatigue life prediction and to analysing the influence of various factor on scarf bolted joints used in an aircraft fuselage. First, the damage-coupled elastic-plastic constitutive equations and fatigue damage evolution equations are presented, and the corresponding numerical calculation algorithm is established using the ABAQUS platform. Then, the proposed fatigue damage model is validated by a group of fatigue tests on scarf joints. Subsequently, the aforementioned approach is applied to the influencing factor analysis of scarf bolted joints. The effects of the scarf angle, the surface friction and the clamping force are investigated in detail. In addition, the sensitivity of the fatigue life with respect to the scarf angle, surface friction and clamping force is evaluated. The effect mechanisms of these factors are revealed clearly, and the influencing trends are presented quantitatively, which has important practical significance for the design of scarf joints.

Keywords: Continuum damage mechanics; Fatigue life; Scarf bolted joint; Scarf angle;