

# **Dual Boundary Element Method applied in aircraft fuselage fatigue analysis**

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## **Abstract**

The continuum mechanics deals with the interaction between two bodies in order to analyze the stresses in the domain due to the contact load. In this way, to compute the stresses, it is considered each body as a semi-infinite in extent and having a plane surface. The Boundary Element Method (BEM) appears as a numerical technique for evaluating this type of problem. Using this technique, the boundary is discretized and the stresses are computed in the body domain. This paper consists of the multiscale analysis via Dual Boundary Element Method (DBEM) of fatigue life of aircraft fuselage plate. The macro analysis is evaluated through the stress field in the plate due to contact mechanics. With this stress field, a micro element, composed by different distribution of cracks, is subjected to fatigue and analyzed by Dual Boundary Element Method (DBEM). This is accomplished using the software BemCracker2D obtaining fatigue life data in each crack increment. For this, advanced computational techniques was developed to evaluate the fracture mechanics behavior with the purpose of ensuring the integrity and the good functioning of the fuselage during its design lifespan.