

Wing Crack Propagation Simulation Using Scaled Boundary Finite Element Method

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Abstract: Considering the existence of side-face loads, a new scaled boundary finite element (SBFEM) shape function is used to study the problem of wing crack propagation. In the solution of crack contact, the contact interface constraint is introduced by Lagrange multiplier method. The polygon SBFEM remeshing technology is used to simulate the crack propagation problem with single and multiple wing crack. Compared with related experimental and numerical simulation results, the correctness and effectiveness of the new SBFEM shape function in solving the wing crack propagation are verified. It is found that under pressure, the wing crack propagates along the direction of the maximum principal compressive stress during initial expansion, and then the crack opens and gradually expands toward the pressure. Wing cracks only have contact phenomena on the initial crack surface during crack propagation. The contact force gradually decreases from the centre to the sides of the initial crack. The friction coefficient has a great influence on the crack propagation direction.