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Fatigue Strength of Dissimilar FSSW Joint between Al Alloy and CFRP

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Abstract

Dissimilar friction stir spot welding (FSSW) joints between an Al alloy 6061-T6 plate and a CFRP plate were fabricated and fatigue tests were performed. The thickness of the both plates was 2 mm, and the spot diameter was 10 mm. A mesh made of steel wires was attached by die pressing on the top of CFRP to enhance the joint with the Al plate. 3 different meshes made of different wires, respectively, were used: a single layer mesh of AISI 316 steel wires, a double layer mesh of AISI 316 steel wires, and a single layer mesh of AISI 329 steel wires. The static tensile shear strengths were more than 1.7 kN and the fatigue strengths at 10^7 cycles were larger than 0.7 kN for all kinds of joint, while the strengths depended on the type of steel mesh. Static and fatigue fracture mechanisms were investigated using a scanning electron microscope (SEM) and discussed further.

Keywords*:* Friction stir spot welding, Dissimilar joint, Aluminum alloy, CFRP, Fatigue