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Ultrasonic characterization of inner defects in cold sprayed coatings

Pure Fe coatings were deposited by cold spraying onto Al substrates with machined notches. Scanning acoustic microscopy (SAM) was utilized to study the mechanical properties of Fe coatings around the notches, where an increased porosity was revealed by SEM. The resulting distributions of ultrasonic wave velocities and their attenuation show that the area affected by the non-perpendicular impact of Fe particles is more complex than observed in the micrographs. Besides that, a bimetal sample was cut along the planar Fe/Al interface, and it was gradually heated to 500 ℃ and then cooled back to room temperature. Due to the formation of the brittle FeAl3 intermetallic phase, a crack initiated and propagated during the cooling, and its shape after the thermal cycling was determined by SAM.

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