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# Thermal Fatigue of MMC Induced by Laser Heating

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The thermal fatigue of particle reinforced metal matrix composites (MMC) induced by laser heating and applied mechanical load was experimentally and numerically studied. It was found that the initial fatigue damage took place near the edge of laser-irradiated region. The initial damage was the form of the void nucleation, growth and subsequent coalescence in the matrix or the interface separation. The fatigue cracks were constituted of void in the matrix, interface separation and particle fracture. The fatigue damage parameters were determined by ultrasonic method. The plane of mechanical load with the times of pulsed laser heating could be divided three regions, i.e. non-damage region, damage region and failure region. The damage processing was numerically investigated by finite element method. The fields of temperature, macroscopical stress and microscopical stress induced by the laser heating and tensile load were numerically obtained. The simulative results were good agreement with the experimental results. KEYWORDS: MMC, Thermal fatigue, Ultrasonic, Laser heating

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