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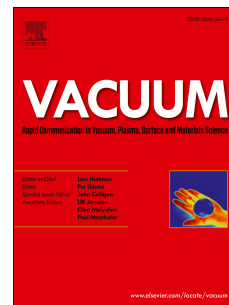
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Vacuum hot pressing and fatigue behaviors of Ti/Al laminate composites

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Abstract: Fatigue crack initiation and propagation have an important influence on the long-term performance of Ti/Al laminate composites, thus vacuum hot pressing and fatigue behaviors of Ti/Al laminate composites were tested to research their fatigue crack initiation, propagation paths, and fatigue crack growth rates. The vacuum hot pressing results indicated that Ti/Al laminate composites prepared by vacuum hot pressing on 550°C exhibited enhanced superior interface bonding and mechanical properties compared with other vacuum hot pressing temperatures. Furthermore fatigue cracks initiated at the edges of fatigue specimens and their initiation mechanism was the serious local plastic deformation resulted from the high stress concentration at the edges of the fatigue specimens. Subsequently, a large triangular tear formed at the fatigue cracking initiations and the fatigue cracks extended in multiple directions to form a large number of micro cracks, but the main developing direction was still perpendicular to the fatigue loading direction. Meanwhile, the interfacial delaminations formed at the first layer of the critical surface, hindering the initiation and propagation of fatigue cracks and releasing fatigue cycle stresses. Besides, the fatigue crack growth was still relatively stable under $0.5\sigma_{0.2}$ stress level, indicating a better fatigue property.

Key words: Ti/Al laminate composites; vacuum hot pressing; fatigue crack initiation; propagation paths; fatigue crack growth rates

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