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C/C-Cu复合材料的载流摩擦磨损行为

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摘 要：采用无压熔渗工艺制备一种新型的具有自润滑耐磨性能的炭纤维整体织物/炭-铜(C/C-Cu)复合材料，在改装的MM-2000型环-块摩擦磨损试验机上考察其载流摩擦磨损性能，利用扫描电子显微镜观察分析磨损的表面形貌，研究不同载荷和电流强度下复合材料磨损表面的变化规律。结果表明：C/C-Cu复合材料的体积磨损率随电流强度和载荷的增大而增大；摩擦因数变化呈单峰曲线，随电流强度的增大先升高后降低；载荷为30和70 N，摩擦因数的峰值出现在10 A；载荷为50 N，摩擦因数的峰值出现在5 A，这与摩擦面粗糙程度有关；电流引发的摩擦面高温是造成对偶表面熔融的重要原因。

关键字：C/C-Cu复合材料；熔渗；滑动磨损性能；加载电流

Electrical sliding wear behavior of C/C-Cu composites

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Abstract: A novel C/C-Cu composite with excellent wear resistance was fabricated by infiltrating molten Cu alloy into C/C preforms. The tribological behavior of the composite block with Cu ring counterpart was evaluated using an MM−2000 friction and wear tester. The worn surface morphologies of the composite blocks and Cu rings were analyzed by scanning electron microscopy. The influences of load and electric current on the tribological behavior of the composites were investigated. The results show that the wear rate of the composites increases with increasing load and electric current. The friction coefficient increases firstly and then drops with rising electric current, following a single peak curve. The peaks of 30 and 70 N appear in 10 A, while that of 50 N appears in 5 A. This may be related to surface toughness. The electric heat on the frictional surface might be the main reason for melting surface on Cu ring counterpart.

Key words: C/C-Cu composites; infiltration; sliding wear properties; electric current

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