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不同制动速度下C/C-SiC-Fe材料的摩擦磨损行为及机理

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摘 要： 以针刺炭纤维整体毡为预制体，采用化学气相沉积法制备C/C多孔体，然后熔融浸渗Si和Fe制得C/C-SiC-Fe材料，研究制动速度对C/C-SiC-Fe材料摩擦磨损性能的影响。采用SEM观察了C/C-SiC-Fe的磨损表面及磨屑形貌，结果表明：C/C-SiC-Fe材料的高速制动平稳，随制动速度的提高其摩擦因数先升高后降低，制动速度为12 m/s时，摩擦因数达到最大值0.59；随着制动速度的提高，磨损率先增加后降低；当制动速度为24 m/s时，磨损率又急剧上升至$3.3\times10^{-8}cm^3/(N\cdot m)$；摩擦磨损机制在低速制动条件下主要表现为磨粒磨损；中速时以粘着磨损为主；高速时以疲劳磨损和氧化磨损为主。

关键字： C/C-SiC-Fe材料；熔融浸渗；制动速度；磨损性能

Tribological behaviour and mechanism of C/C-SiC-Fe composites at different braking speeds

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Abstract: C/C performs were prepared by densification of needled carbon fiber felts with CVD. The C/C-SiC-Fe braking composites were manufactured by infiltration of moltening Si and Fe into the obtained C/C performs. The tribological characteristics of C/C-SiC-Fe composites at different braking speeds were investigated. The worn surfaces of C/C-SiC-Fe and the wear debris were examined by SEM. The results show the brake of C/C-SiC-Fe composites at high speed is stable. The coefficient of friction rises to the maximum of 0.53 at braking speed of 12 m/s firstly and then falls with increasing braking speed. The wear rates have similar change at the beginning but increase rapidly to the maximum of $3.3\times10^{-8}cm^3/(N\cdot m)$ at braking speed of 24 m/s. The wear mechanism changes from abrasion, adhesion to fatigue and oxidation with increasing braking speed.

Key words: C/C-SiC-Fe material; reactive melt infiltration; braking speed; wear properties

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