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Friction of Carbon Fibre TowsDaniel M. Mulvihill^{*}, Olga Smerdova⁺, Michael P.F. Sutcliffe

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ABSTRACT

The fundamental frictional behaviour of carbon fibre tows relevant to composite fabric forming is explored. Tow-on-tool and tow-on-tow contact are considered. For tow-on-tool contact, an experiment is devised to simultaneously observe the true filament contact length and measure the friction force over a range of normal loads. Filament contact length is not constant, as would be given from an idealised assumption of parallel touching filaments, but increases in a characteristic manner with normal load. Friction force follows a power law variation with normal load with exponent in the range 0.7–1. Accounting for the evolving contact length in a Hertzian calculation of the real contact area produces a contact area versus load variation which differs only by a constant factor from the measured friction force curves. Thus, the results agree with a ‘constant interface strength’ model of friction. Tow orientation and sizing are found to have a significant effect on friction by altering the real contact area.

Keywords:

A. Carbon fibres

A. Tow

E. Forming

Friction

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