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Tribological investigation of carbon fiber-epoxy composite reinforced by metallic filler layer

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Abstract: This work aims to develop a carbon fiber/epoxy composite reinforced by metal fillers (Copper/Stainless steel) in order to improve the tribological properties. For this, a tribological study has been conducted using a ball-on-disc configuration. The surface of the material has been modified by deposing a layer of metal powder during manufacturing. For a better understanding of the wear mechanisms, the worn surface characteristics have been examined using a scanning electron microscope (SEM). The coefficient of friction and the wear rate under different normal loads have been determined for the filled and unfilled composite. The results obtained revealed an increase of the wear rate with the increase of the applied load. Metallic filled carbon–epoxy showed better wear resistance and friction behaviour under different loads. In fact, microhardness measurement showed that the surface hardness has been greatly influenced by the metal filler. The overall results illustrate the impact of metal powders in the modification of polymer matrix composites surfaces. This method is promising to improve the tribological properties.

Keywords : Polymer matrix composites, Metallic fillers, wear, Coefficient of friction