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**Size dependent strengthening mechanisms in carbon nanotube reinforced metal
matrix composites**

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Abstract

The matrix grain size plays a dual role in metal matrix composites (MMCs). Contrary to enhance the strength of matrix, grain refinement can weaken the thermal expansion mismatch strengthening induced by the reinforcement. In this article, a dislocation density based model is developed to describe the factors affecting the strengthening mechanisms in CNT-reinforced MMCs with different matrix grain sizes. Two kinds of thermal expansion mismatch strengthening mechanism are considered, i.e., geometrically necessary dislocations (GNDs) are distributed in entire matrix and GNDs are limited in DPZs. In addition, comparisons between the predictions and some available experimental results are also performed.

Keywords: A: Metal matrix composites (MMCs); B: Microstructures; B: Stress transfer; C: Analytical modelling

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