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Thermoelastoplastic Behavior of Discontinuously-Reinforced Composites Considering Reinforcement Damage

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The particle and short-fiber reinforced composites are used in different engineering applications. Therefore, in the analysis of the composite materials not only the mechanical loading but also the thermal loading should be studied. Due to loading conditions, some reinforcement may be cracked and/or debonded from the matrix. Consequently, the load carrying capacity of the reinforcement depends on whether the reinforcement is intact, cracked or debonded from the matrix. The constitutive equation of composite material which take into account the damage process and the change in temperature is necessary in order to solve these phenomena. In this paper, an incremental constitutive equation of the particle and short-fiber reinforced composites with progressive cracking damage of the reinforcement has been developed considering the temperature change and elastoplasticity. By modifying the load carrying capacity of the damaged reinforcement, the present constitutive equation can describe the cracking damage and the debonding damage of the reinforcement as well as the perfect composite.

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