Stiffness reduction in UD and cross-ply laminates due to fiber/matrix interface cracks

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Abstract

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1. Introduction

2. Derivation of constitutive relations

$$\beta_{ij} = \frac{1}{V_k} \int_{S_C} \frac{1}{2} \left(u_i n_j + u_j n_i \right) dS \tag{1}$$

$$\beta_{11} = \frac{1}{V_k} \int_{S_C} \frac{1}{2} \left(u_1 n_1 + u_1 n_1 \right) dS = \frac{1}{V_k} \int_{S_C} \cancelto{0}{u_1 n_1} dS = 0 \tag{2}$$