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Micro-CT based modeling of residual stresses and crack propagation in metal-ceramic composites

Micro-computed tomography (micro-CT) of real material microstructure are employed in numerical modeling of thermal residual stresses and fracture in metal-ceramics composites manufactured by powder metallurgy or metal infiltration of porous ceramic preforms. Two case studies are considered in detail to illustrate the proposed approach at work: (i) thermal residual stresses in sintered Cr/Al₂O₃ and NiAl/Al₂O₃ particulate composites, and (ii) J-integral for compact tension test specimen made of alumina preform infiltrated with molten copper. Comparisons with experimental measurements are shown. Effectiveness and limitations of the proposed method are discussed.

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