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THERMAL FRACTURE MECHANISMS IN CERAMIC THERMAL
BARRIER COATINGS

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Ceramic thermal barrier coatings represent an attractive method of increasing the high temperature limits for systems such as diesel engines, gas turbines and aircraft engines. However, the dissimilarities between ceramics and metal, as well as the severe temperature gradients applied in such systems, cause thermal stresses which can lead to cracking and ultimately spalling of the coating. This paper reviews the research which considers initiation of surface cracks, interfacial edge cracks and the effect of a transient thermal load on interface cracks. The results of controlled experiments together with analytical models are presented. The implications of these findings to the differences between diesel engines and gas turbines are discussed. The importance of such work for determining the proper design criteria for thermal barrier coatings is underlined.

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