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**Stress evolution in top coat of thermal barrier coatings by considering strength
difference property in tension and compression**

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Abstract

The experimental research shows that ceramic top coat (TC) exhibits obvious strength difference (SD) in tension and compression, called SD property. This property significantly affect stress evolution, however, there are few attentions to it. In this paper, the stress evolution in TC layer is investigated by considering SD property. To reflect its property, a return mapping algorithm model for unified strength theory (UST), proposed by us, is applied. The results reveal that SD property leads to the movement of maximum tensile stress from interface to the position above it. It suggests that the crack might not be directly initiated at interface but above it, which has been reported in experimental studies too. The results also reveal that the possibility of above-interface cracking could be increased by varying the material properties, such as

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