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The Influence of Remote Stresses on the Near Crack Tip Stress Field

Ewa Turska, Krzysztof Wisniewski

IFTR PAS, Warszawa, Poland

The near crack tip stress field serves as one of the main guidelines in fracture mechanics. Two methods of finding this field can be specified. While one consists of retaining only terms valid in the infinitesimal vicinity of the crack tip, the other is obtained by infinitely extending the whole crack. For one unloaded crack these approaches give the same results. For interacting cracks or cracks with loads acting on their planes, we get an improper statement of the boundary value problem (loss of uniqueness). This occurs for elastic and elastic-plastic materials. In the paper we present examples and a discussion which enables to distinguish the differences. Also the kinked crack tip is analyzed in the case of a small kink or small angle, explaining the differences of solutions in literature.

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