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Simplified Linearized Layering Method for Stress Intensity Factor Determination

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Abstract : This paper looks to reduce the complexity of determining stress intensity factors while maintaining high levels of accuracy by the use of a linearized layering approach. Many techniques for stress intensity factor determination exist, but they can be limited by conservative results, requiring too many user parameters, or by being too computationally intensive. Multiple notch geometries with various crack lengths were investigated in this study to better understand the effectiveness of the proposed method. By linearizing the average stresses in radial layers around the crack tip, stress intensity factors were found to have error ranging from -10.03% to 8.94% when compared to analytically exact solutions. This approach proved to be a robust and efficient method of accurately determining stress intensity factors.

Keywords : fracture mechanics, finite element method, stress intensity factor, stress linearization
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