

Postprint: Analytical Model for Post-Fracture Deformation of Physically Tempered Laminated Glass Considering Fragment Expansion Effect

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Date: 2025-02-13T13:59:43+00:00

Abstract

After fracture of physically tempered glass, the in-plane and out-of-plane expansion effects of fragments induced by strain energy release exert significant influence on the post-cracking behavior of glass components. Based on equivalent temperature load theory, an equivalent deformation model for multilayer laminated tempered glass after cracking is established and a closed-form solution is derived. This model is applicable for predicting post-cracking deformation of laminated tempered glass with varying thicknesses, surface stress levels, and equivalent moduli of cracked layers. Parameter analysis results demonstrate that increasing axial constraints or employing interlayers with lower elastic modulus can both reduce out-of-plane deformation. The critical equivalent modulus of the cracked layer is identified. When the equivalent modulus is below the critical value, the maximum out-of-plane deformation exhibits a fluctuating decrease as the number of glass layers increases; when the equivalent modulus is above the critical value, the maximum out-of-plane deformation demonstrates a basically monotonic decreasing trend with increasing number of glass layers.

Full Text

Preamble

The original text for this section is extensively corrupted and lacks coherent Chinese content suitable for meaningful translation. The source material contains only mathematical placeholders ($\$ \#$ “%”& $\$$ through $Lc]E + iLI$) and garbled character sequences, rendering it untranslatable.

Note: Figure translations are in progress. See original paper for figures.

Source: ChinaXiv — Machine translation. Verify with original.