
An explicit solution for the elastic quarter-space and general wedge problem in matrix formulation

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Abstract

Obtaining analytical solutions for quarter-space and general three-dimensional wedge problems is challenging. Consequently, alternative methods like the finite element method are often employed. This paper introduces an explicit matrix algorithm for solving quarter-space and general 3D wedge problems under surface loads. The methodology involves overlapping two half-spaces formed by the surfaces of a wedge, with all calculations based on half-space equivalent loads. The generated matrices depend solely on the mesh structure and Poisson's ratio, making them applicable to various loading scenarios. This approach significantly enhances the efficiency of numerical iterative analyses, such as elastohydrodynamic lubrication (EHL) of contacts in an elastic quarter-space or truncation. Some truncated EHL solutions using the current matrix solution will be presented.

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