Kolloquium Mechanik

RUHR-UNIVERSITÄT BOCHUM

UNIVERSITÄT DORTMUND

Vortragsankündigung

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Thema: **STRESS AMPLIFICATION IN VANISHINGLY SMALL GEOMETRIES**

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Inhalt:

In narrow regions of materials, between holes or holes and free boundaries, or between cracks, inclusions, etc. which we call thin ligaments, the stress amplifies singularly as the ligament thickness vanishes. The question that arises is how the stress behaves in vanishingly small geometries, i.e., how the stress relates asymptotically to the thickness and whether the amplification is a function of the geometry, or both the geometry and the loading. For many classical problems such as a hole near a boundary in tension, or under body forces (tunnel problem), the solution is given in bipolar coordinates in terms of a nonuniformly convergent series. Singular asymptotics of series have been developed in order to obtain the limiting stress in the ligament as the ligament thickness vanishes. It is found that for a semi-infinite solid containing a hole of radius R near a free boundary, or two holes approaching each other (with ligament thickness d) under tension at infinity, the stress has been shown to amplify singularly as $\sim \left(\frac{d}{R}\right)^{-1/2}$. Comparisons of the analytic solution with beam theory approximation (proposed by W. T. Koiter and J. B. Keller) are made. Several examples for different geometries and loadings (including traction, pressure, body force, thermal and dislocation loadings), are presented.

Veranstalter:
O.T. Bruhns, K. Hackl, J.F. Kalthoff, S. Reese (Ruhr-Universität Bochum)
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