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Deformations of an elastic half plane with a circular cavity. (English) Zbl 0918.73014
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Summary: An analytical solution is given of the class of problems of an elastic half plane with a circular cavity, loaded on the cavity boundary. The solution uses complex variables, with a conformal mapping onto a circular ring. The coefficients in the Laurent series expansions of the stress functions can be expressed through a single constant by a system of recurrent relations, obtained from the boundary conditions. The remaining constant can be determined from the requirement of convergence of the series. For the case of a uniform radial stress at the cavity boundary, the solution can be given in closed form, confirming known results for the stresses, but also giving simple explicit expressions for the displacements.

MSC:

74B05 Classical linear elasticity

74S30 Other numerical methods in solid mechanics (MSC2010)

Cited in **25** Documents

Keywords:

conformal mapping onto circular ring; convergence of series; analytical solution; Laurent series expansions; stress functions; recurrent relations; uniform radial stress

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