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SOME PROBLEMS OF THE PLANE THEORY OF ELASTICITY FOR DOMAINS WITH PARTIALLY UNKNOWN BOUNDARIES

Let a homogeneous isotropic elastic plate occupy on the plane $z = x + iy$ a domain S whose boundary is a set of linear segments and unknown smooth arcs.

It is required to determine the stressed state and an equirigid part of the boundary assuming that, on each linear segment, normal displacement takes a constant value, tangential stress is equal to zero all along the boundary, and constant normal stress is given on the unknown contours. In the case of an infinite domain, a constant stress field is assumed to be acting at infinity.

Exact solutions of the problems are obtained in the following cases:

(a) S is the exteriority of simple closed contours lying along ox and oy. It is assumed that linear segments are parallel to the coordinate axes, while the domain is symmetrical with respect to these axes;
(b) S is the exteriority of one contour in the case of cyclic symmetry;
(c) S is a simply connected finite domain in the case of cyclic symmetry.