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THE CONTACT PROBLEM FOR AN ANISOTROPIC WEDGE-SHAPED PLATE WITH AN ELASTIC STRENGTHENING OF VARIABLE RIGIDITY

We consider plane-strassed state of an infinite elastic anisotropic wedge, strengthened over one boundary by an elastic bar whose rigidity varies by the law: x^α (x is the distance from the wedge vertex, α is any real number). Tangential load of intensity $\tau_0(x)$ is applied along the bar.

The problem is reduced to the Carleman type problem for a strip with the boundary condition

$$G(t)\Psi(t) - H\Psi(t - i(\alpha - 1)) = F(t), \quad -\infty < t < \infty,$$

where $G(t)$ and $F(t)$ are the given meramorphic functions and H is a constant.

The problem is solved in a closed form, the contact stress along the line of strengthening in the vicinity of the angle vertex admits the estimate

$$\tau(x) - \tau_0(x) = \begin{cases} O(x^{\alpha-2}), & \alpha > 2, \\ O(x^{\tau_0-1}), & 1 < \alpha \le 2, \\ O(x^{\tau_1-1}), & \alpha \le 1, \end{cases}$$

where $\tau_0 = \operatorname{Im} z_0$ and $\tau_1 = \operatorname{Im} z_1$, z_0 is the nearest to the real axis pole of the function $G(z)$ in the lower half-plane, z_1 is the nearest to the real axis zero of the function $G(z)$ (for $\alpha = 1$, of the function $G(z) - H$) in the lower half-plane.