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THE CONTACT PROBLEM OF INTERACTION OF ELASTIC BEAM OF VARIABLE RIGIDITY WITH ELASTIC BASIS

A contact problem for anisotropic plate in the shape of angle ($-Q < \arg z < 0$) is investigated when a semi-infinite beam of variable bending rigidity dx^α ($d > 0, \alpha \geq 0$) leans on one of the edges and the other edge of the angle is free. A distribution of strains in the plate and flexure in the beam must be determined in case when a normal load of intensity $P_0(x)$ effects on the beam.

Applied problem is reduced to the Karleman boundary-value problem for a strip, an exact solution for any value α is obtained.

It is proved that an unknown contact normal strain in the vertex of angle for any Q and in case of $\alpha \geq 3$ admits the estimate: $P(x)-P_0(x) = O(x^{\alpha-3})$, $x \to 0$ and for large x : $P(x) - P_0(x) = O(x^{-(1+\tau_0^+)})$, $\tau_0^+ > 0$.

In case of $2 < \alpha < 3$, in the vertex of the angle we get: $P(x) - P_0(x) = O(x^{-(1+\mu_0^-)})$, $-1 < \mu_0^- < 0$.

For $\alpha < 2$ a normal contact strain can be bounded or unbounded near the point $x = 0$ and for large x : $P(x) - P_0(x) = O(x^{-(3-\alpha)})$.

Concrete results for different values of Q and also the results in case of an orthotropic plate are obtained.