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On Some Models of Indentation for Functionally-Graded Coatings

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The paper presents approximate models of deformation for an inhomogeneous elastic strip. Approximate models reflect the distribution features of the inhomogeneous structure properties over the thickness. The models are based on hypotheses about the nature of the change in the components of the displacement field, which allows to consider arbitrary laws of heterogeneity: continuous, as well as discontinuous or having a strong gradient. Solutions of the contact problem for different inhomogeneity laws are constructed. Comparative analysis of the models is carried out. The results of the solutions are compared with the solution based on the FE model.

Key words: coating, functionally graded material, indentation, inhomogeneous strip.

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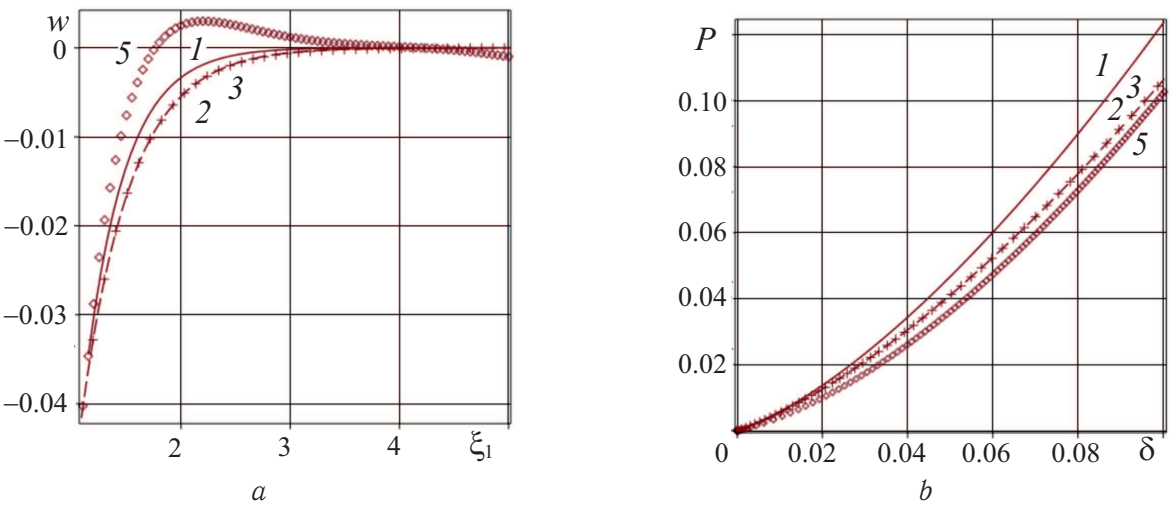

Fig. 1. Vertical displacement of the upper border (*a*) and dependence „Force-Indentation“ (*b*) for continuous laws of heterogeneity. In Fig. 1–3 numbers of curves *1–4* correspond to the numbers of approximate models, curve *5* to the finite element model

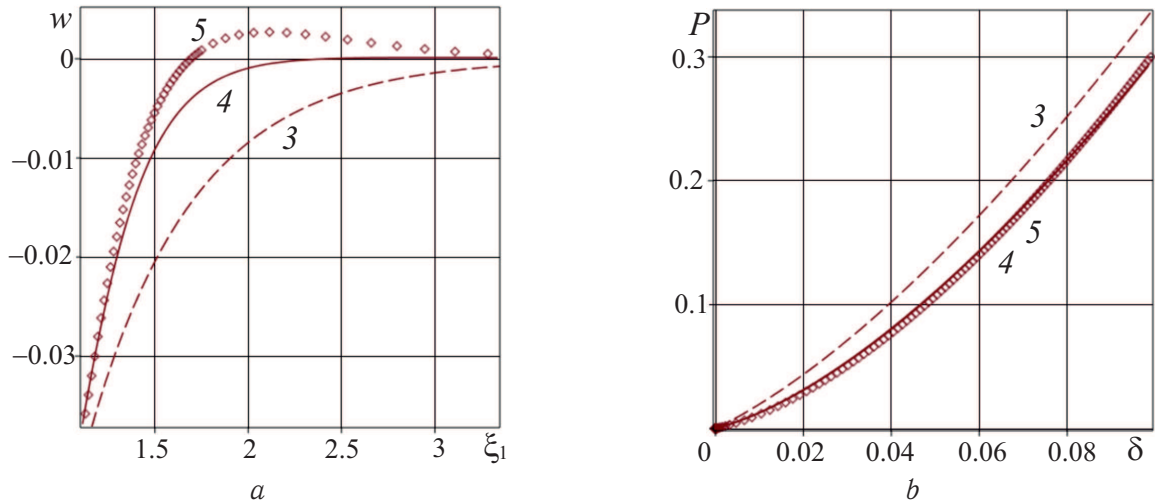

Fig. 2. Vertical displacement of the upper border (*a*) and dependence „Force-Indentation“ (*b*) for discontinuous laws of heterogeneity

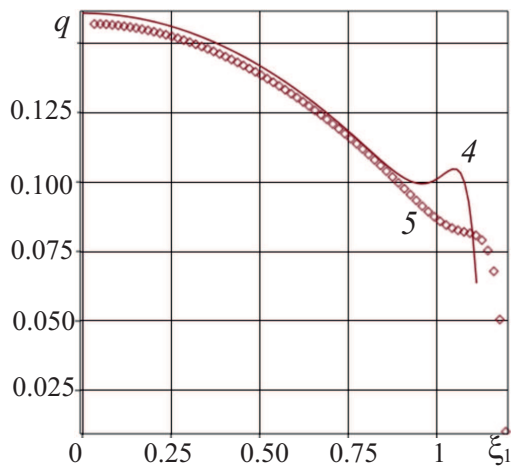

Fig. 3. Contact pressure under punch

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