A Singular Integral Equation with Sum-Difference Kernel Arising in Contact Problems with Friction

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We consider an integral equation derived from the contact problem for elastic half-space indented with friction by a rigid cylinder. The mixed boundary-value problem of planar elasticity was formulated in bipolar coordinates. Elastic displacement and stresses in the half-space were represented by two harmonic Papkovich-Neuber functions in the form of the Fourier expansions. The problem was reduced to the singular integral equation with sum-difference kernel with respect to unknown normal pressure in the slip contact zones. An exact analytical solution of this equation was constructed by the Wiener-Hopf technique.