On one contact problem of plane elasticity for a doubly connected domain

Nana Odishelidze

e-mail: nana.odishelidze @tsu.ge

Department of Computer Science, Department of Theoretical Informatics, Faculty of Exact and Natural Sciences, Iv. Javakhishvili Tbilisi State University, Tbilisi, Georgia

Abstract.

The paper addresses a problem of plane elasticity theory for a doubly connected body whose external boundary is a regular hexagon boundary, and the internal boundary is the required full-strength hole including the origin of coordinates. Hexagon's two vertices are laid at the axis Oy, and the middle points of its two opposite sides are laid at the axis Ox. The full-strength hole is cycle symmetric. It is assumed that to every link of the broken line of the outer boundary of the given body are applied absolutely smooth rigid stamps with rectilinear bases, which are under the action of force P that applies to their middle points. There is no friction between the surface of given elastic body and stamps. The unknown full-strength contour is free from outer actions. Using the methods of complex analysis, the analytical image of Kolosov–Muskhelishvili's complex potentials [1] (characterizing an elastic equilibrium of the body) and unknown parts of its boundary are determined under the condition that the tangential normal stresses arising at it take a constant value. Such hole is called a full-strength hole. Numerical analysis is also performed and the corresponding graphs is constructed.

References

[1] N. Muskhelishvili, Some Basic Problems of the Mathematical Theory of Elasticity. Fundamental Equations, Plane Theory of Elasticity, Torsion and Bending, XXXI. Noordhoff International Publishing, Leyden, (1975) 333.