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Summary: In this paper, we present a modification of the Somigliana identity for the 3D Navier-Lamé equation in order to analytically include in its mathematical formalism the boundary represented by Coons and Bézier parametric surface patches. As a result, the equations called the parametric integral equation system (PIES) with integrated boundary shape are obtained. The PIES formulation is independent from the boundary shape representation and it is always, for any shape, defined in the parametric domain and not on the physical boundary as in the traditional boundary integral equations (BIE). This feature is also helpful during numerical solving of PIES, as from a formal point of view, a separation between the approximation of the boundary and the boundary functions is obtained. In this paper, the generalized Chebyshev series are used to approximate the boundary functions. Numerical examples demonstrate the effectiveness of the presented strategy for boundary representation and indicate the high accuracy of the obtained results.

MSC:
65N38 Boundary element methods for boundary value problems involving PDEs
45E05 Integral equations with kernels of Cauchy type
65R20 Numerical methods for integral equations

Keywords:
boundary integral equations (BIE); Somigliana identity; parametric integral equation system (PIES); parametric surface patches; Navier-Lamé equation

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