

Method of complex potential in the theory of composites

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Method of complex potential is a powerful constructive method of applied complex analysis where an analytic function plays the fundamental role. A wide class of physical two-dimensional stationary fields are described by harmonic and biharmonic functions, hence, by analytic functions. The relation between analytic and harmonic functions in simply and multiply connected domains are derived. The classic problems of mathematical physics are stated as boundary value problems. The special attention is devoted to problems of the theory of composites. The methods of integral and functional equations associated to Schwarz's alternating method are presented. The constructive homogenization procedure is explained in terms of the elliptic functions on torus.