Preface

In this book, thermal stress resistance of materials is considered comprehensively, in terms of various parameters of thermal loading, defining service conditions of the components of energy generators, machine-building, nuclear power, space technology and products of other industrial fields.

All aspects of thermal stress resistance (including experimental methods of measuring thermal stress resistance, designs for estimation of the thermal and residual stresses), regularity of change of thermal stress resistance and fractures (depending on loading requirements) and the structural conditions of materials (including monocrystals) are all reviewed, together with their complex relationships. The evolution of theoretical concepts about thermal stress resistance from energy as well as about statistical positions and principles of fracture mechanics are analysed. The behaviour of high-temperature materials (carbides, nitrides and oxides) is preferentially surveyed in the temperature range of an elastic–brittle fracture.

Special attention is given to an examination of the influence of thermal loading modes on fracture conditions and the development of thermal stress resistance criteria, both of which are helpful in estimating the bearing capacity of a body in non-uniform and local fields of thermal stresses and at a cumulative thermal-force action. Possible technological expedients and methods for increasing the thermal stress resistance of materials are discussed.

Most part of the data given in this book represents the results of experiments conducted from 1965 to the present time by researchers at LUCH, the scientific research institute of the Agency of the Russian Federation on Atomic Energy.

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Anatoly Lanin,
Ivan Fedik

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