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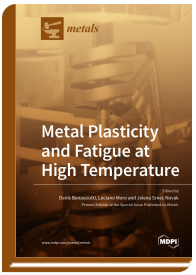
Special Issue Reprint

Metal Plasticity and Fatigue at High Temperature



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In several industrial fields (such as automotive, steelmaking, aerospace, and fire protection systems) metals need to withstand a combination of cyclic loadings and high temperatures. In this condition, they usually exhibit an amount—more or less pronounced—of plastic deformation, often accompanied by creep or stress-relaxation phenomena. Plastic deformation under the action of cyclic loadings may cause fatigue cracks to appear, eventually leading to failures after a few cycles. In estimating the material strength under such loading conditions, the high-temperature material behavior needs to be considered against cyclic loading and creep, the experimental strength to isothermal/non-isothermal cyclic loadings and, not least of all, the choice and experimental calibration of numerical material models and the selection of the most comprehensive design approach. This book is a series of recent scientific contributions addressing several topics in the field of experimental characterization and physical-based modeling of material behavior and design methods against high-temperature loadings, with emphasis on the correlation between microstructure and strength. Several material types are considered, from stainless steel, aluminum alloys, Ni-based superalloys, spheroidal graphite iron, and copper alloys. The quality of scientific contributions in this book can assist scholars and scientists with their research in the field of metal plasticity, creep, and low-cycle fatigue.

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