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**Numerical simulation of the mechanical behavior of ultrafine-grained and coarse-grained Zr-Nb alloys over a wide range of strain rates** VLADIMIR V. SKRIPNYAK, NATALIA V. SKRIPNYAK, IRINA K. VAGANOVA, EVGENIYA G. SKRIPNYAK, VLADIMIR A.. SKRIPNYAK, National Research Tomsk State University — Multi-scale computational model is proposed for the investigation of deformation and fracture of ultrafine-grained and coarse grained $Zr - Nb$ alloy in a wide range of strain rate and temperature. The model takes into consideration the distribution of grain sizes. Model describes the shear stress relaxation under tension and compression at the homologous temperature below 0.5. The numerical results on dynamic and quasi-static deformation of Zr−1 vol. % Nb alloy are good agreed with experimental data. Strain rate sensitivity of the yield stress of Zr–Nb alloys at fixed temperature depends on the concentration of Nb, and parameters of grain size distribution. It is shown that Zr–Nb alloys exhibit significant difference in the resistance to plastic deformation under compression and tension at high strain rates.

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