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High temperature impact response of copper EUGENE ZARETSKY, Ben-Gurion Universitry, Israel, GENNADY KANEL, Institute for High Temperatures, Russia — The evolution of elastic-plastic shock waves with the propagation distance has been studied in 99.999-% purity polycrystalline copper. The free surface velocity histories of 0.1 to 2.0 mm thick samples shock-loaded from initial temperatures 300 to 1353 K, have been recorded using VISAR. Experiments confirmed anomalous growth of the HEL value with temperature. With approaching melting temperature the growth becomes stronger while the shape of the elastic precursor wave changes and becomes spike-like. These changes are possibly caused by the increase of the amount of lattice defects near melting. Results of measurements of the precursor decay at different initial temperatures have been converted into relationships between the shear stress and the initial plastic strain rate at the top of the precursor wave. The strain rate was found to decrease over 0.25 to 2-mm precursor traverse from 2×10^6 to $6 \times 10^4 \mathrm{s}^{-1}$ at 1353 K and from 7×10^4 to $2.3 \times 10^3 \mathrm{s}^{-1}$ at 300 K. An analysis of the rise times of the plastic shock waves has shown that for the same level of shear stress, the plastic strain rate at the shock front at 300 K is by a factor of 300 and at 1353 K is by a factor of 30 higher than just behind the elastic precursor front.

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