Effect of shear strength on the Hugoniot-compression curve and EOS of some metals TSUTOMU MASHIMO, YUYA GOMOTO, XUN LIU, Kumamoto University, EUGENE ZARETSKY, Ben-Gurion University of the Negev, MASAHIDE KATAYAMA, Itochu Techno-Solutions Corporation, KUNIHITO NAGAYAMA, Kyushu University — To derive true equations of state (EOS) of matter, we need the precise Hugoniot data, and must access the strength under shock compression to draw the isothermal hydrostatic compression curve. For this, we have established the high-speed streak camera measurement system consisting of rotating-mirror type streak camera and pulsed dye laser combined with the one-stage powder gun and two-stage light gas gun. We performed the plate-mirror Hugoniot measurement experiments on tungsten (W), copper (Cu), etc. in the pressure range up to >200 GPa by symmetric impact method, and measured the Hugoniot data where the effects of tilt and bowing of the impact plate were carefully considered. It was found that the zero-intercept value (C0) of Us-Up relation (Us =C0+SUp) of W were larger than the bulk sound velocity by 3.1%, which may show the effect of shear strength in plastic region. The hydrostatic-compression curves were drawn by using the shear strength values reported by Sandia National Laboratories group, and the EOS's were discussed. The hypothesized Us-Up Hugoniot curve of the hydrostatic compression curve converged to the bulk sound velocity.

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