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Critical Plastic Strain as a Criterion for Failure in Ballistic Impact Experiments of U/Ti and Ti64 Alloys B. HERRMANN, D. SHVARTS, NNRC, V. FAVORSKY, E. ZARETSKY, Ben Gurion University, Israel — Strain localization and failure in U-0.75Ti and Ti-6Al-4V alloys were studied in symmetric (rod-on-rod) and reverse ballistic (disk-on-rod) impact experiments accompanied by VISAR monitoring of the lateral sample surface velocity. Softly-recovered samples were metallurgically examined, and numerical simulations of the experiments were performed with AUTODYN 2-D code. Satisfactory reproduction of both the measured velocity profiles and the results of the metallography examination of the damage produced by adiabatic shearing were obtained using the Steinberg-Cohran-Guinan-type constitutive equation, calibrated in preliminary planar impact experiments and the AUTODYN built-in erosion function. A good agreement was found between strain measured by using natural martensite (U/Ti) and texture (Ti64) markers and corresponding to the onset of adiabatic shearing (0.5 - 1.0) and the value of the critical plastic strain used in the simulations as a criterion for triggering the erosion function (0.6 for both alloys). In Ti64 the shearing is finalized by cracks developed at observed strain of 1.0 - 1.5 whereas in the U/Ti the shear strain reaches values of 30 - 60 and terminated by void growth and coalescence.

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