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Multi-step Kolsky bar loading of metals which fail by adiabatic shear banding YECHESKEL ASHUACH, ZVI ROSENBERG, CHEN AVINADAV, Rafael Advanced Defense Systems Ltd. — In a previous work we showed that thermal softening of materials in Kolsky bar tests can be eliminated by multiple step loading. Specimens made of metals which tend to undergo adiabatic shear banding fail at relatively low strains, due to local heating which enhances local reduction in strength. In this paper we present results from multi-step loading tests performed in our interferometry-based Kolsky bar, with specimens made of titanium and magnesium alloys and stainless steel. Multi-step loading should prevent the local heating of the specimen and, consequently, move the occurrence of shear banding to higher strains. However, our experiments showed that these specimens fail at about the same strains under multi-step and single loadings. Thus, the mechanism which is responsible to shear banding cannot be related to local heating and a new approach is needed to explain this phenomenon.

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