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Two-step loading in a Split Hopkinson Pressure Bar (SHPB) at different strain rates RACHEL BRIGGS, DAVID WILLIAMSON, DANIEL DRODGE, WILLIAM PROUD, University of Cambridge — In conventional Split Hopkinson Pressure Bar (SHPB) testing the striker bar is single-piece and made of the same material as the input- and output-bars. When the striker-bar strikes the input-bar the resulting top-hat stress profile travels down the input-bar and the sample is loaded at a strain-rate related to the magnitude of that top-hat stress. (Actually, strain and strain-rate are calculated from the reflected wave). Here we show results from a system that uses a composite striker-bar formed from two equal lengths of materials with different mechanical impedances. When the composite striker-bar strikes the input-bar the result is a two-step stress profile. Correspondingly, the sample is consecutively loaded at two different strain-rates. This can be a low strain-rate followed by a higher strain-rate, if the low impedance element is first incident on the input-bar, or vice versa. The major benefit of this method is that the sample does not experience repeat loading or significant unloading between the two regimes. This paper outlines the current state of research and details the important observations to date.

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