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Temporal Softening and its Effect upon Spall Strength VIKTOR SKOKOV, OLGA IGNATOVA, ANDREY MALYSHEV, VIKTOR RAEVSKY, ALEKSEY PODURETS, OLGA TUPANOVA, RFNC-VNIIEF, MARVIN ZOCHER, LANL — Experimental observation has revealed that the effects of shock wave loading are extremely complex, often resulting in morphological changes that result in a hardening of the material. Temporal softening that precedes the aforementioned hardening has also been observed. In Al and Cu, the duration of this softening is on the order of 0.3 to 0.5 ms. This work has revealed that, at least in some cases, this temporal softening phenomenon is attributable to the formation of complex bi-periodic twin structures. The overall morphology of these structures is rather complex, consisting of what we shall refer to as "packages," with each "package" being composed of two sets of parallel twins aligned in a quasi-herringbone pattern. It is probable that the temperature within the "package" is much higher than the temperature of the surrounding material during "package" formation. The formation of bi-periodic twin structures and concomitant temporal softening has an effect upon spall strength. That effect is explored in the work to be presented. Samples are loaded by short duration pulses (0.2 - 1 ms) in such a way that the onset of damage occurs within the period of temporal softening. This has enabled an assessment of the softening effect on spall strength.

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