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A study of pre-stress effect on the failure waves in glasses ANDREY SAVINYKH, Institute of Problems of Chemical Physics, GENNADY KANEL, Joint Institute for High Temperatures, SERGEY RAZORENOV, Institute of Problems of Chemical Physics, A. RAJENDRAN, U.S. Army Research Office — Results of shock-wave experiments with free and pre-stressed samples of K8 crown glass, K14 crown glass and fused quartz are presented. Controlled confinement pressure on the specimen in the range of 200 MPa to 300 MPa was provided by installing a shrink-fit metal sleeve on the lateral surface of the sample disk. The shock compression pulses of approximately triangular profile were created using thin aluminum impactors and PMMA base plates. The peak shock stresses in the range of 5.5 GPa to 8.5 GPa were sufficient to initiate the failure waves, whereas following unloading stopped the cracking. Results of measurements of the free surface velocity histories show that pre-stressing results in earlier braking of the failure wave. Thus, the compressive transversal stress increases the failure threshold that is in agreement with existing criteria of compressive fracture. The work was supported by the US Army Research Office through CRDF GAP grant number RUE2-1615-MO-06.

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