Abstract Submitted
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Phenomenological description of the failure waves in glasses[1] G.I. KANEL, Joint Institute for High Temperatures, Moscow, A.S. SAVINYKH, G.V. GARKUSHIN, S.V. RAZORENOV, Institute of Problems of Chemical Physics, A. RAJENDRAN, US Army Research Office — A combustion-like model of failure wave has been developed accounting for new data on the response of intact and comminuted glass to longitudinal and bulk compression and release. The bulk compressibility of soda-lime glass was measured by the mixture method. It has been found that, under uniaxial compression, the Poisson's ratio increases up to the value close to 0.5. The strong dependence of the Poisson's ratio on deviatoric stress results in increase of average unloading impedance of cracked glass that explains small value of the recompression signal. On the other hand, experiments with step-like compression demonstrate decreased impedance for further compression of cracked glass. The failure wave model includes equations of state of intact and comminuted glass, a criterion of compressive fracture, and an equation that relates damage accumulation rate to the damage parameter gradient. Computer simulations with this model reproduce well all details of observed behavior of the glass.

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