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Dynamic behaviour of birch and sequoia at high strain rates

BRAGOV ANATOLY, Head of Laboratory, D.Sc., PhD, LOMUNOV ANDREY, Senior Researcher, PhD, SERGEICHEV IVAN, Senior Researcher, PhD, GEORGE GRAY III, Team Leader - Dynamic Materials Properties: Testing and Modelling — The paper presents results of experimental analysis for structural woods, i.e. birch and sequoia at high strain rates. Monotonic and cyclic compression testing at room temperature of these materials was performed by experimental Kolsky method, using the 20-mm diameter split Hopkinson pressure bar (SHPB). The cut out specimens were loaded along and across fibers of woods, as well as, in others angles of cutting out from wooden materials. There were obtained dynamic deformation diagrams in various above conditions for these materials. Directions of specimens' cutting out, as well as, confined conditions effect on mechanical dynamic properties of the woods tested. Loading and unloading branches of stress-strain diagrams obtained are nonlinear and strain rates sensitive. Post-failure behavior of woods' specimens tested results from various forms of their fracture, such cracking and spalling. Experimental stress-strain curves showed significant influence of cutting out angles of specimens on fracture stresses' values. Dynamic deformation diagrams at cyclic loading, obtained by original modification of SPHB, are also presented for tested materials. Alongside with the SHPB tests, plane-wave experiments were conducted and the shock adiabates for the wood samples were obtained.

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