

Slab Fracture At 1900 Frames Per Second-Experimental Methods

Chris Borstad, David McClung

University of British Columbia, Vancouver, BC, Canada

We present high speed video images of slab fracture experiments. Slab bending tests were conducted in a cold laboratory at Rogers Pass in Glacier National Park of Canada. A testing machine recorded the applied force and slab deflection in three- and four-point bending. Over the course of four days, the bending and resulting tensile fracture of 66 samples were captured by a high speed camera at rates of 1000 and 1900 frames per second. The purpose of capturing the tests on video was to observe the size of the fracture process zone and to calculate the speed of crack propagation. Slab samples were seeded with tracer particles for image analysis calculations, with the resulting pixel resolution in the sub-millimeter range. The samples were back-lit to illuminate the propagation of the crack. Dry slabs of differing density, hardness, crystal form and size, and temperature were sampled. Slabs of the same composition but different size were tested to investigate the size effect. The peak strength, stiffness, and shape of the loading curve were found to be very sensitive to the loading rate.