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# Photo-piezometric study of supershear fracture

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The radiation from supershear dynamic rupture is investigated on laboratory faults in a transparent, hard resin slab. We combine acoustic emission acquisition and high speed photography to measure the wavefield and track the rupture front propagation. Transducers detect the wavefield both close and at a distance from the fault, allowing to characterize the amplitude and the decay of (1) mach wavefronts radiated from the supershear fractures and (2) diffractions emitted by stop-and-go jerks in fracture propagation. A number of laboratory experiments and earthquake observations attest the existence of fracture propagation at supershear velocity. However, failure to observe any strong shock wave in the recordings of natural earthquakes has fired a debate on the amplitude and attenuation expected for the mach wavefront (Bernard and Beaumont, 2005; Bizzarri & Spudich, 2008), which we characterize here experimentally for spontaneously nucleated fractures. In our experimental 2D geometry the mach wave shows a lesser order of geometrical decay with propagation distance than body waves, in agreement with theoretical predictions, and becomes dominant in the far field.