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Dielectric characterization and microwave interferometry of HMX-based explosives[1] JOSEPH TRINGE, RON KANE, THOMAS LORENZ, EMER BALUYOT, KEVIN VANDERSALL, Lawrence Livermore National Laboratory — Microwave interferometry is a useful technique for understanding the development and propagation of detonation waves. The velocity of the front can be determined directly with the instantaneous phase difference of the reflected microwave signal from the detonation front and the dielectric constant of the explosive. However, the dielectric constant of HMX-based explosives has been measured only over a small range of wavelengths. Here we employ an open-ended coaxial probe to determine the complex dielectric constant for LX-10 and other HMX-based explosives over the full 5-50 GHz range. The development and propagation of detonation waves in both heavily- and lightly-confined cylindrical charge geometries will also be highlighted. In some experiments the microwave reflective properties of the region behind the detonation front are characterized by using a remotely-positioned microwave waveguide probe. Ionization pins and Manganin gauges were used with microwaves simultaneously to verify the technique as the detonation front progresses.

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