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Detonation Theory for Condensed Phase Explosives with Anisotropic Properties[1] D. SCOTT STEWART, MATTHEW SZUCK, U.of Illinois, MechSE, LAURENCE E. FRIED, Lawrence Livermore National Laboratory —
Energetic materials that are crystals in their unreacted state have anisotropic material properties due to their underlying molecular structure. For example crystalline explosives like PETN and azides have exhibit different threshold initiating shock pressure depending on which crystal face is shocked. We discuss our recent efforts to build theory of sustained detonation that has both strong directional dependence and effects. We use a continuum phase field theory that is capable of describing the transition from anisotropic unreacted solid to reacted condensed products. The material behavior is allowed to include anisotropic elasticity and heat conduction and directionally preferential diffusion and reaction.

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