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Modelling of detonation in PBX 9502 with a stiffened-gas EOS mixture model[1] CHARLES KIYANDA, MARK SHORT, Los Alamos National Laboratory — An analytically tractable model of detonation in PBX 9502 is developed. It consists of a mixture of reactant and product materials, with each component represented by a stiffened-gas equation of state. The five free thermodynamic parameters in the model allow us to address some of the restrictions of simpler analytical models. We first explore generic properties of the steady ZND detonation structure under this model. Secondly, we show that fitting of the thermodynamic data to experimental data on reactant and product properties yields non-intersecting Hugoniot curves. The associated chemical kinetic scheme consists of two reaction steps. The first step has a pressure dependent rate term. It takes the reactants to an intermediate state, a mixture of effectively mostly gaseous products with some solid carbon. The second step models the clustering of solid carbon atoms. Popplot and detonation velocity vs. curvature data are used to fit the chemical kinetic parameters. Finally, the linear stability of PBX 9502 detonation waves modeled by the stiffened gas system is studied.

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Charles Kiyanda
Los Alamos National Laboratory

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