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The physical background of a new detonation model ALAIN FROGER, Commissariat a l'Energie Atomique — We previously described /1/ a detonation model suitable to simulate highly transient evolutions such as SDT or detonation failure. This model involves a special thermodynamical description on the mixture in the reaction zone. It requires neither additional sub-models like celerity/curvature relationship nor special equations of state for the mixture. In this paper, we emphasize the physical background of the model. By applying mechanics and thermodynamics laws in the reaction zone, we proved that the energy of detonation is not a physical constant but is depending on the local thermodynamical state. We also showed that an equation of state cannot be defined for the mixture in the reaction zone. These two points are the fundamentals of the model. Moreover we derived important energy relationshis that explain i) how the detonation failure occurs, ii) why the possible detonation celerity is restricted between D_{CJ} and roughly $0.9D_{CJ}$for high explosives and iii) why insensitive explosives are high explosives.

1- A. Froger "A reaction zone enthalpy balance model to simulate shock-to-detonation transition and unsteady wave propagation" 2003 APS-SCCM conference (Portland, OR,USA, July 20-25 2003)

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