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**Discrete effects in energetic materials**

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The classical theory of detonation wave propagation has been highly successful in prediction of detonation dynamics based on a macroscopic, continuum-based approach, wherein the heterogeneity of the energetic material only enters the model via the reaction rate term (e.g., hot-spot based reaction mechanisms). The effects of spatial heterogeneity are rarely treated explicitly in detonation models. However, considerable evidence can be found that mesoscale phenomenon can influence the dynamics of the detonation front on scales larger than the heterogeneities. This evidence is critically reviewed, and possible directions for modeling approaches that incorporate the spatial granularity (discreteness) of the energetic material are suggested.