

Abstract Submitted
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On the role of unreacted pockets in unstable detonation waves

JONATHAN REGELE, Iowa State University — Pockets of unreacted fluid surrounded by combustion products form and react behind unstable detonation waves. It is unclear how the pockets interact with the detonation front and whether or not their reaction helps sustain detonation propagation. With the wide range of scales present in unstable detonations, unreasonable computational resources are required to perform direct numerical simulations that capture the complex interactions between diffusion, turbulence, and autoignition. In order to develop a basic understanding of what role these pockets may play, a simplified acoustic timescale analysis of unreacted pockets is performed to classify the behavior regimes. This classification is used to interpret experimental data and determine if the reaction of these pockets is isobaric and can be neglected or if compression or even shock waves are created. The generation of compression or shock waves suggests that these pockets may play a role in sustaining the detonation wave.

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