

Abstract Submitted  
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**On the Partially Reacted Boundary Layer in Rate Sticks** YEHUDA

PARTOM, Retired — Using our reactive flow model TDRR to simulate detonation in a rate stick, we observe that a partially reacted layer (PRL) is formed near the boundary. We are not aware that such a PRL has been observed in tests, and this is why we regarded it in the past as a numerical artifact. Assuming that such an artifact may be caused by the finite rise time of the detonation shock, we showed in [1] how it can be eliminated by delaying the outward boundary motion for a length of time comparable with the shock rise time. Here we revisit the PRL problem. First we show that it is not a numerical artifact but a real phenomenon. We do this by repeating the reactive flow run with a finer resolution. By looking at the PRL structure, we see doubling the resolution affects the PRL only slightly. We then conjecture that the PRL formation has to do with the finite duration of the reaction process (or the finite extent of the reaction zone). By the time the boundary rarefaction reaches a cell near the boundary, it is only partially reacted, and its reaction is cut off. To strengthen our conjecture we also show how the PRL structure changes with the reaction duration.

[1] Yehuda Partom, Reactive Flow calculation near a Free Boundary, SCCM, 405-408 (2007).

Yehuda Partom  
Retired

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