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Localized structures in gaseous combustion EDGAR KNOBLOCH, University of California at Berkeley, DAVID LO JACONO, ALAIN BERGEON, IMFT, Université de Toulouse, UPS-INP — We consider a flame between a pair of porous walls at $x = \pm 1$ that allow fuel and oxidizer to diffuse into the burn region from opposite sides. The burn process is described by a binary one-step process of Arrhenius type. The heat released is redistributed via radiation. Convection is ignored. In 1D the low and high temperature states are connected by an S-shaped branch with a fold at low Damköhler number below which extinction takes place. Various instabilities occur on the upper (flame) branch leading to different time-dependent but 1D flames. In 2D the situation is dramatically modified: near the extinction region the burn front breaks up into structures that are localized in the direction along the front, with multiple branches of such states bifurcating from the fold. These correspond to states with $n = 1, 2, \ldots$ identical and equispaced hotspots. Further bifurcations generate states in which the hotspots are nonidentical and separated by unequal distances. All these states are present in the same parameter interval, implying great sensitivity of the system to initial conditions.

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