

Flame initiated by a line heat source in a planar stream and the motion of an isolated flame ring between two parallel plates: analytical and numerical analysis

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The aim of this work is to investigate a steady-state structure in the form of a localized circular premixed flame, or flame ring, moving between two non-adiabatic parallel plates, in the so-called Hele-Shaw device. For this purpose, we explore an auxiliary problem describing the flame anchored by a line heat source situated perpendicularly to the flow of reactants moving with a given constant velocity relative to the source. It turns out that, solutions for this auxiliary problem in the limit of heat source tending to zero are only possible for certain values of the controlling parameters. In turn, these limit solutions describe the constant velocity motion of propagating premixed flame rings in the Hele-Shaw device.

