Gravity-induced premixed flame instability and dynamics

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Dynamics of a flame under normal gravity conditions is induced by convection forces [1, 2]. The flame geometry impact is noticeable for the flame stability. For example, flames with the same flow rate and composition parameters are exhibiting different dynamics properties depending on the stabilization method (flame geometry) [3]. In the present work, the dynamics of an inverted conical flame depending on the direction of the flow in respect to the gravity vector is studied. An analysis of high-speed video images showed the frequency of flame oscillations in a wide range of flow rates and fuel equivalence ratio. The paper shows that gravity plays a significant role in the stability of such flames.

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