Dynamics of diffusive flames

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I will report on an ongoing collaboration with L. Caffarelli on regularity and geometry of the singular parabolic equation $\beta(u)_t = \Delta u$ where $\beta(r) = 2r - r^+$. The latter equation arises in a variety of different applicative contexts ranging from control theory to mechanics, biology, and finance. I shall focus on its relation with the so called Burke-Schumann model for diffusive flames. In particular, I will present the basic features of the combustion model along with some special flame geometry. Moreover, I shall comment on global regularity, characterization of self-similar flames, non-degeneracy of flame sheets, and extinction phenomena.