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The critical conditions for the onset of pool-fire puffing WILFRIED COENEN, DANIEL MORENO-BOZA, University of California San Diego, JAIME CARPIO, Universidad Politcnica de Madrid, ANTONIO L. SNCHEZ, FORMAN A. WILLIAMS, University of California San Diego — Pool fires are known to exhibit a self-sustained oscillatory behavior, shedding large toroidal coherent structures at a well established frequency that scales with the macroscopic properties of the flow, a phenomenon referred to in the literature as *puffing*. This behavior influences the rate of air entrainment, the radiated heat output, the flame height, and also the spreading of the flame. Pool-fire puffing has been studied extensively in the literature, and it is well known that under normal conditions of temperature and pressure typical hydrocarbon fuel pools of a few centimeters in diameter puff with a frequency on the order of 10Hz. Nevertheless, no detailed account has been given of the critical conditions for the *onset* of puffing. The present work focuses on the latter aspect, encompassing experiments, linear global stability analyses, and direct numerical simulations. In particular, we obtain the critical Rayleigh number, which is the only governing parameter of the problem, for different fuels, obtaining results that show good agreement between experiments and theory/numerics.

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