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Puffing flame instability - Part II: Predicting the onset and frequency[1] PHILIPP BOETTCHER, JOSEPH SHEPHERD, SHYAM MENON, GUILLAUME BLANQUART, California Institute of Technology — Experiments and simulations have been performed on fuel rich n- hexane air mixtures in a closed vessel. Both experiments and simulations show a distinct cyclic combustion or "puffing" mode. The misalignment of buoyancy induced pressure gradients and density gradients across the flame front is responsible for the generation of vorticity and its subsequent roll-up into vortex rings. In the present work, a simplified model is proposed based on the fundamental interactions between fluid mechanical and chemical parameters. This simplified fluid mechanics model is based on dimensional analysis and is used to predict the onset and frequency of the puffing behavior.

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Philipp Boettcher
California Institute of Technology

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