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Experimental Study of a Turbulent Liquid Flame. MICHAEL LE BARS, CNRS, IRPHE UMR 7342, Marseille (France), BAPTISTE ISNARD, Ecole Normale Supérieure de Lyon et IRPHE UMR 7342, Marseille (France), CHRISTOPHE ALMARCHA, Aix-Marseille Univ, IRPHE UMR 7342, Marseille (France) — Turbulent deflagrations are of fundamental importance for industrial applications and security issues. When the environment is congested by numerous obstacles, the turbulence generated by the blast upstream of the front strongly influences the flame speed and its acceleration. Our objective is to characterize experimentally turbulent premix combustion so as to improve its modeling and predictability. In particular, we aim at collecting experimental data for a critical analysis of flame velocity models, based on detailed non-intrusive measurements of local turbulence and front parameters. We investigate the coupling between turbulence and the premixed flame interface thanks to a so-called liquid flame, using an autocatalytic chemical reaction [1]: this chemical reaction generates an intermediate product that increases the reaction rate, leading to the building-up of a front with the final products in close similarity with premixed combustion. In our system, the turbulence is generated by 2 oscillating grids. PIV-PLIF measurements allow simultaneously quantifying the turbulence rate and the front evolution. The experimental results are used to challenge the predictions from classical theoretical and numerical models. [1] Shy et al. Combust. Flame 1999. Pocheau & Harambat PRE 2006.

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