

DIFFUSIVE-THERMAL INSTABILITIES OF THE BURNER STABILIZED METHANE-HYDROGEN AIR FLAMES

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In this work we report our recent results on the analysis of the diffusive-thermal instabilities of the burner stabilized methane-hydrogen-air flames. The investigation is undertaken by means of (a) the direct numerical simulation of combustion wave dynamics by using the mathematical model with the detailed reaction mechanism and (b) experimental study of the chemiluminescence and LIF of OH* radicals. The methodology is described in detail in [1,2]. The typical configuration used in experiments is shown in figure 1.

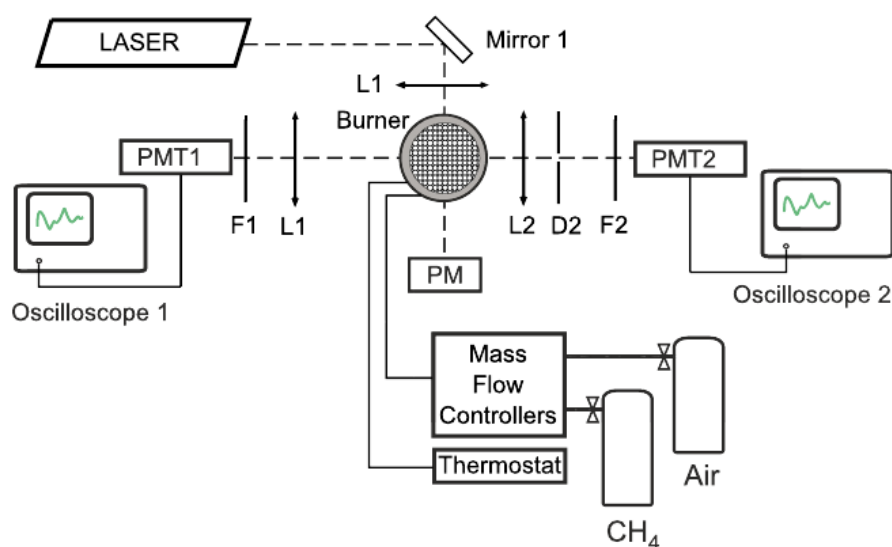


Fig. 1. The scheme of experimental setup.

The results obtained by various approaches are compared and it is demonstrated that the difference between the numerical data calculated with different reaction mechanisms is greater than the experimental uncertainty, demonstrating that the proposed technique can be used to verify the reaction mechanisms. The prospects of further work is discussed.

REFERENCES

- [1] Mislavskii, V., Pestovskii, N., Tskhai, S., Kichatov, B., Gubernov, V., Bykov, V., & Maas, U. (2021). Diffusive-thermal pulsations of burner stabilized methane-air flames. *Combustion and Flame*, 234, 111638.
- [2] Nechipurenko, S., Miroshnichenko, T., Pestovskii, N., Tskhai, S., Kichatov, B., Gubernov, V., ... & Maas, U. (2020). Experimental observation of diffusive-thermal oscillations of burner stabilized methane-air flames. *Combustion and Flame*, 213, 202-210.