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**Exploration of Unstable Spray Flames Using Reduced-Order Models** ABDULLA GHANI, THOMAS STEINBACHER, ALP ALBAYRAK, WOLFGANG POLIFKE, TU Munich — We investigate low-frequency thermoacoustic instabilities of a swirling spray flame. This study is based on an aeronautical lab-scale experiment, for which a reduced-order model (ROM) has been generated. A parametric study of the ROM suggests that the instability mechanism is caused by an intrinsic thermoacoustic (ITA) feedback loop. Further analysis such as separation of acoustic and ITA modes or the scaling of the ITA frequency with the bulk velocity confirm the ITA feedback loop as the instability driver. Results of the ROM agree well with experimental observations and demonstrate the effectiveness of ROMs.

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