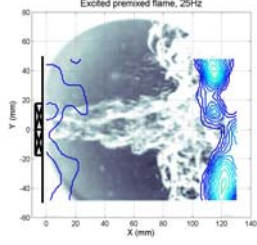
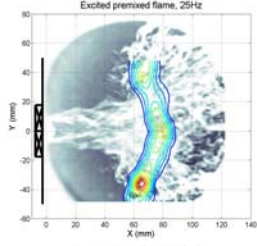
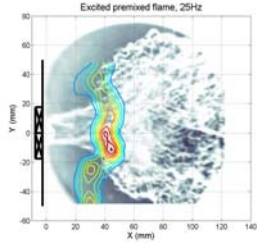
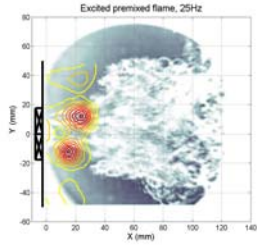
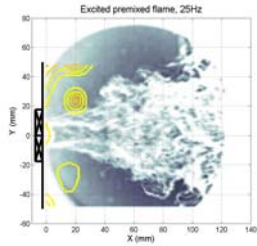
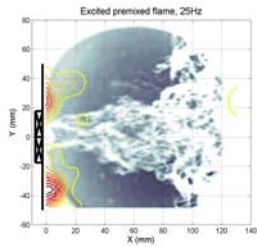




TOSCA

Technology for Oscillating and Steady-State Combustion Analysis

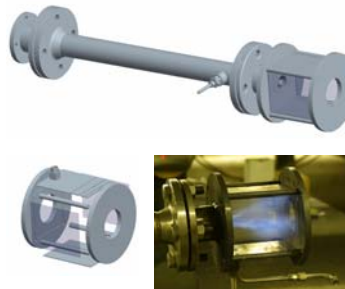
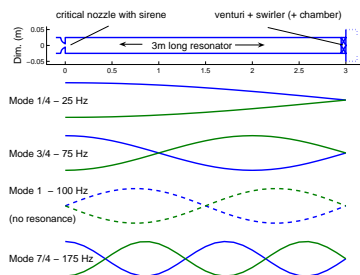


Superposed flame dynamics with corresponding density fluctuation: 25 Hz resonance

### The TOSCA Project

- Reproduce experimentally combustion instabilities such as “Humming” occurring in gas turbines
- Develop ad-hoc instrumentation in order to analyse the physics of the instability in details
- Contribute to the development of effective counter-measures in order to stabilise combustion and extend system life duration and performance

### The experimental test rig



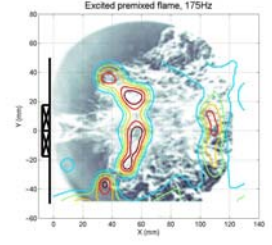
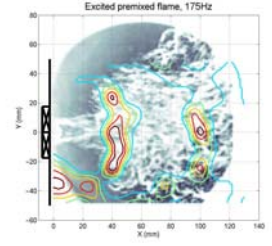
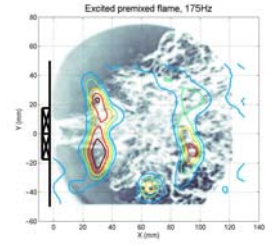
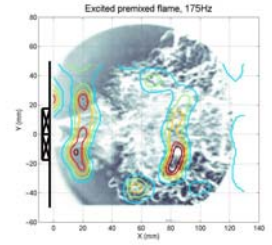
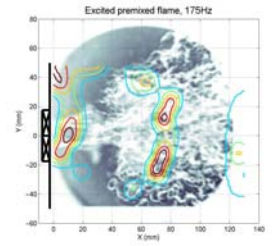
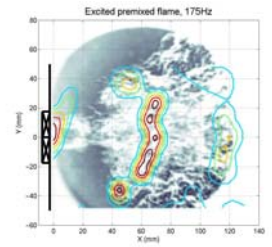
- Atmospheric premixed air-methane flame
- Venturi 1/2 + 45 degrees axial swirl at the injection
- Dump combustor with optical access
- Resonant cavity, quarter wave mode
- Amplification of the resonant modes 25Hz, 75Hz, 125Hz, 175Hz,... with the ONERA siren

### Adapted measurement techniques and main results

- Phase-defined measurements
- High-speed schlieren visualisation  
⇒ FLAME STRUCTURE
- Dual Laser-Vibrometry technique  
⇒ DENSITY FLUCTUATION

### More information

- F. Giuliani, B. Wagner, J. Woisetschläger, F. Heitmeir. Laser vibrometry for real-time combustion stability diagnostic. Proceedings of the ASME Turbo Expo 2006, GT2006-90413
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Superposed flame dynamics with corresponding density fluctuation: 175 Hz resonance

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Graz University of Technology