Operation at low fuel-to-air ratio in turbo-machinery, such as gas-turbine power plants and jet engines is desirable from an economic and environmental perspective. Unfortunately combustion instabilities arise in this regime. There is a strong tendency to try to eliminate these instabilities through control.

A control model for combustion instabilities issued from an experimental work on gas turbine done jointly by Univ. of California, San Diego and United Technologies will be presented. The objectives of the talk are:

1) To demonstrate analytically (using Krylov-Bogoliubov methods) that this model is able to reproduce the experimentally observed phenomena and in particular the simultaneous coexistence of two non-harmonic oscillatory modes

2) To show that the model can be used for the analytical design of feedback quenching strategies using fuel flow modulation as a multiplicative control input.

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