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Amélioration de l'efficacité et réduction de la pollution par modélisation et contrôle des instabilités de combustion
Improving efficiency and reducing pollution by modeling and control of combustion instabilities

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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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His research interests encompass theory and applications in system identification, adaptive control, robust digital control and nonlinear systems. He has authored and co-authored over 200 papers on these subjects. He is the author or co-author of several books including: *Adaptive Control - The Model Reference Approach* (Dekker 1979) and *Digital Control Systems – design, identification and implementation* (Hermès 2002, Springer 2005).

Dr. Landau received the Rufus Oldenburger Medal 2000 from the American Society of Mechanical Engineering. He is "Doctor Honoris Causa" of the Université Catholique de Louvain-la-Neuve (2003). He was a R. Springer Professor at the University of California, Berkeley (1992). He received the price Monpetit from the French Academy of Science (1991), the "Best Review Paper Award (1981-84)" from ASME Journal of Dynamical Systems Measurement and Control, the CNRS Silver Medal in 1982 and the Great Gold Medal at the Invention Exhibition Vienna in 1968. He was an IEEE-CSS "Distinguished Lecturer" (2001-2003) and has been appointed "IFAC Fellow" in 2007

At CNRS, he was the Director of several co-ordinated research programs and Director of the Laboratoire d'Automatique de Grenoble from 1987 to 1990. Dr. Landau was the first President of the European Union Control Association (EUCA) and Editor in Chief of the European Journal of Control from 1994 to 2003.

Mercredi 8 octobre