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Control of oscillator and amplifier flows

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Flow control aims at the targeted manipulation of inherent flow behavior and is a critical component in efforts to delay instabilities, reduce drag, decrease receptivities or extend the operational parameter range of a fluid device. The design of flow control strategies relies on a model for the fluid system but also a model for the noise environment. For flows that are insensitive to external noise (oscillator flows), effective control strategies have been designed with considerable success; for flows that respond sensitively to environmental noise (amplifier flows), however, the design of effective control schemes is far more challenging, as it crucially depends on the quality of the noise model. We will present and discuss the critical steps in the design of flow control schemes for both types of flow behavior and compare and contrast a model based and data-based approach. This presentation summarizes joint work with Denis Sipp (ONERA-DAFE) and various doctoral students.