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Comparison of two different approaches for the control of convectively unstable flows FABIEN JUILLET, PETER SCHMID, Ecole Polytechnique, BEVERLEY MCKEON, CalTech, PATRICK HUERRE, Ecole Polytechnique — The probably most widely used control strategy in the literature is based on the Linear Quadratic Gaussian (LQG) framework. However, this approach seems to be difficult to apply to some fluid systems. In particular, due to their high sensitivity to external noise, amplifier flows are hard to control and the classical LQG compensator may be unable to describe the noise with sufficient accuracy. Another strategy aims at directly measuring these noise sources through a sensor called "spy." The LQG and the spy approaches will be presented and compared using the Ginzburg-Landau equation as a model. It will be shown that the use of a spy is particularly relevant for convectively unstable systems. In addition, the ability of Subspace Identification Methods to provide satisfactory models is demonstrated. Finally, the findings from the Ginzburg-Landau investigation are generalized and applied to a more realistic system, namely a backward-facing step at $Re = 350$. Support from Ecole Polytechnique and the Partner University Fund (PUF) is gratefully acknowledged.

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