

Local-in-time Global Control of Non-Dissipative Systems with Partial Measurements

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One of the fundamental challenges of accurate simulation of turbulent flows is that initial data is often incomplete, which for said flows is a strong impediment to accurate modeling due to sensitive dependence on initial conditions. A continuous data assimilation method proposed in ¹, known as the Azouani-Olson-Titi (AOT) or Continuous Data Assimilation (CDA) algorithm, introduced a linear feedback control term to dissipative systems, giving a simple and rigorous deterministic method by which to understand the underpinnings of more complex data assimilation algorithms used in the geosciences for, e.g., weather and climate prediction. The ability of the AOT algorithm to recover solutions in non-dissipative systems has only recently been explored in ², demonstrating the criticality of the dissipation assumption. Inspired by ³, we will discuss in what scenarios we can effectively apply the AOT algorithm to non-dissipative systems (in particular the passive scalar and Euler equations), obtaining decay on the error between the reference solution and the data assimilation solution in the Sobolev and analytic norms for short time given analytic data. A preprint of this work is forthcoming as of February 2025.

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¹ A. Azouani et al., *J. Nonlinear Sci.*, **24**(2), 277–304 (2014)

² E.S. Titi et al., *arXiv*, 1–26 (2024)

³ A. Biswas et al., *Pure Appl. Funct. Anal.*, **7**(1), 81–97 (2022)