

Abstract Submitted  
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**Estimation of the Proximity and Density Field of a Moving Gaseous Source Using a Sensing Aerial Vehicle**<sup>1</sup> NIKOLAOS GATSONIS, JEFF COURT, MICHAEL DEMETRIOU, WPI — This work considers the estimation of the density field arising from an unknown moving gaseous source in the troposphere using measurements obtained with a sensor onboard an aerial vehicle. The gas dispersion process is modeled by the advection-diffusion partial differential equation in 3d with spatially and time varying ambient mean velocity and eddy diffusivities. Our approach strongly couples the adaptive, multigrid numerical solution of the advection-diffusion PDE with the estimate of the process state (spatio-temporal density) as provided by the maxima of concentration localization estimation scheme. The guidance of the sensing aerial vehicle is dictated by the performance of the estimation scheme. Computational results demonstrate the effectiveness of the approach in estimating the density of the plume and the proximity of the gaseous source under realistic atmospheric conditions.

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