

GEVREY REGULARITY FOR A CLASS OF  
DISSIPATIVE EQUATIONS

Animikh Biswas

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**Abstract**

In this paper, we establish Gevrey class regularity of solutions to a class of dissipative equations with a general quadratic nonlinearity for initial data in certain Besov type spaces. We then apply our result to the Navier-Stokes equations, the surface quasi-geostrophic equations, the Kuramoto-Sivashinsky equation and the barotropic quasi-geostrophic equation. In particular, we provide an alternate proof, as well as  $L^q$  extensions, of the results of Oliver and Titi (*Journal of Functional Analysis* **172**, no. 1, (2000), pp. 1–18) concerning temporal decay of solutions to the Navier-Stokes equations in higher Sobolev norms. We also obtain a new class of initial data where such decay holds for the 2D Navier-Stokes equations. Similar decay result is also proven for the 2D surface quasi-geostrophic equation.

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