The Asymptotic Behavior for the Sub-critical Dissipative Quasi-Geostrophic Equation

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Abstract. In this work, we give a complete description of asymptotic behavior of the quasi-geostrophic equations in the subcritical range $\gamma \in (\frac{1}{2}, 1]$. We first show that its solutions simplifies asymptotically as $t \to \infty$. More precisely, solutions behave as an interesting particular solution normalized by the mass as $t \to \infty$ and when the initial data belongs to $L^1(\mathbb{R}^2) \cap L^{\frac{2}{2\gamma-1}}(\mathbb{R}^2)$. On the other hand, we show that solutions with initial data in $L^{\frac{2}{2\gamma-1}}(\mathbb{R}^2)$ decay towards zero as $t \to \infty$ in this space. All results are obtained regardless of the size of the initial condition. Joint work with Jose A. Carrillo (UAB, Spain).