



SEMINÁRIO DE EQUAÇÕES DIFERENCIAIS

Local theory for the surface quasi-geostrophic equation in
exterior domains

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Resumo: We study the exterior problem with Dirichlet boundary conditions for the SQG equation via a spectral representation of the fractional Laplacian $(-\Delta)^s$, $0 < s < 1$, based on a generalization of the Fourier transform for exterior domains. We then implement a localized version of $(-\Delta)^s$ due to Caffarelli and Silvestre, as improved by Stinga and Torrea.

We give applications to the problem of existence of weak solutions of the two dimensional dissipative quasi-geostrophic equation and the large-time decay of these solutions in the L^2 -norm through a modified version of the Fourier splitting technique due to M. Schonbek.

Lastly, we explore local well-posedness of this system in critical spaces using Littlewood-Paley localizations based on precise pointwise estimates for the heat kernel of the Dirichlet Laplacian.