On a Class of Nonlocal Evolutionary Problems with Gradient-type Constraints

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We study the solutions of nonlocal problems with local and nonlocal gradient type constraints, the nonlocal gradient being the distributional Riesz fractional gradient. We show new existence results on the solution of an Monge-Kantorovich type equation in an open domain with Dirichlet boundary conditions. The solution is given by a couple, the transport density and the potential u, which solves a variational inequality with a nonlocal gradient constraint. Using a penalisation of the transport flux we extend to the case of nonlocal second order linear operators with only somable coefficients the existence of Lagrange multipliers, which includes the case of the classsical local anisotropic problem related to the elastoplastic torsion problem. This is a joint work with Assis Azevedo and Lisa Santos.