

## SEMINÁRIO DE ANÁLISE E EQUAÇÕES DIFERENCIAIS

Dia 12 de Outubro (quinta-feira), às 13h30, sala 6.2.33

# Lagrange multipliers and transport densities

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**Abstract:** We consider a stationary variational inequality with nonconstant gradient constraint and we prove the existence of solution of an equivalent Lagrange multiplier problem.

If the gradient constraint  $g$  is sufficiently smooth, satisfies  $\Delta g^2 \leq 0$  and the source term belongs to  $L^\infty(\Omega)$ , we are able to prove that the Lagrange multiplier belongs to  $L^q(\Omega)$  for  $1 < q < \infty$ , even in a very degenerate case. Without the restriction on the sign of  $\Delta g^2$ , the Lagrange multiplier belongs to  $L^\infty(\Omega)'$ .

We also prove that if we consider the variational inequality with coercivity constant  $\delta$  and constraint  $g$ , then the family of solutions  $(\lambda^\delta, u^\delta)_\delta$  of our problem has a subsequence that converges weakly to  $(\lambda^0, u^0)$ , which solves the problem with  $\delta = 0$ . When  $g \equiv 1$ , this limit is solution of the mass transport problem.

(Joint work with Assis Azevedo)

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