

HARDY TYPE INEQUALITY AND SUPERCRITICAL WEIGHTED SOBOLEV INEQUALITIES

JOSÉ FRANCISCO DE OLIVEIRA *

In this talk we give improvements to Hardy-type inequalities on weighted Sobolev spaces. Precisely, we investigate suitable conditions to

$$S_\varphi = \sup \left\{ \int_0^R r^\theta |u|^{\varphi(r)} dr \mid u \in AC_{loc}(0, R], u(R) = 0 \text{ and } \int_0^R r^\alpha |u'|^p dr = 1 \right\} < +\infty$$

where $R, \alpha, \theta > 0, p \geq 1$ are real numbers, $\varphi(r) = p^* + r^\sigma$, with $\sigma > 0$ and p^* is the critical exponent $p^* = \frac{\theta+1}{\alpha-p+1}$, for $\alpha - p + 1 > 0$. The above supremum can be associated with an weighted Sobolev space which is a powerful tool to study a class of semilinear elliptic equations including Laplace, p -Laplace and k -Hessian operators.

*Department of Mathematics, Federal University of Piauí, email: jfoliveira@ufpi.edu.br