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About a problem with multiple regions of singularities

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In this talk I am going to present some results about existence, uniqueness, multiplicity and regularity of solutions for the following quasilinear λ-problem involving variable exponents

$$\begin{cases} -\Delta_{p(x)}u = c(x)d(x)^{-\beta(x)}u^{-\alpha(x)} + \lambda f(x,u) \text{ in } \Omega, \\ u > 0 \text{ in } \Omega;\ u = 0 \text{ on } \partial\Omega. \end{cases}$$

One of our main interest is presenting conditions on the variable exponents, powers and $f(x,u)$ to show existence and uniqueness of $W^{1,p(x)}_{loc}(\Omega)$-solutions for situations of multiple regions of singularity in the sense that both $\beta(x)$ and $\alpha(x)$ may change signs in either Ω or $\partial\Omega$. Another interest point is establishing conditions on such terms to get multiplicity of solutions still permitting oscillations of the power $\alpha(x)$, that is, multiple regions of singularities and non-singularities of the term $u^{-\alpha(x)}$ for $u > 0$.

Joint work with Thiago Willians Ramos (Instituto Federal de Brasília - IFB) and Claudianor de Oliveira Alves (Universidade Federal de Campina Grande-UFCG).

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