

Double phase problems involving critical Sobolev nonlinearities

Alessio Fiscella

Departamento de Matemática
Universidade Estadual de Campinas, IMECC
fiscella@ime.unicamp.br

In this talk, we discuss about recent results for double phase problems involving critical Sobolev nonlinearities. More precisely, our problems are driven by the so-called double phase operator given by

$$\operatorname{div} (|\nabla u|^{p-2}u + a(x)|\nabla u|^{q-2}u) \quad \text{for } u \in W^{1,\mathcal{H}}(\Omega),$$

set on an appropriate Musielak-Orlicz Sobolev space $W^{1,\mathcal{H}}(\Omega)$, with $1 < p < q < \infty$ and $a \in L^\infty(\Omega)$ such that $a(x) \geq 0$ a.e. in Ω . Our problems present some difficulties due to the presence of singularities and the lack of compactness of the critical Sobolev embeddings for $W^{1,\mathcal{H}}(\Omega)$. Under suitable assumptions for weight a , exponents p and q , we are able to provide the existence and multiplicity of solutions for our problems, by applying different variational approaches. The results presented in this talk are based on the papers [1, 2, 3].

References

- [1] C. FARKAS, A. FISCELLA AND P. WINKERT, Singular Finsler double phase problems with nonlinear boundary condition, *Adv. Nonlinear Stud.* (2021) DOI: <https://doi.org/10.1515/ans-2021-2143>
- [2] C. FARKAS, A. FISCELLA AND P. WINKERT, On a class of critical double phase problems, submitted paper, available at <https://arxiv.org/abs/2107.12835>
- [3] C. FARKAS AND P. WINKERT, An existence result for singular Finsler double phase problems, *J. Differential Equations* **286** (2021) 455-473.