Universidade de Brasília
Instituto de Ciências Exatas

Analysis Seminar

The joy of cylinders

Danilo Gregorin Afonso

Università degli Studi di Urbino Carlo Bo - Italy

Date: Sep. 20, 2024

Time: 10:10 am

Address: MAT/UnB Auditorium

Abstract. Radial solutions to differential equations of the type $-\Delta u = f(u)$ in radially symmetric domains have been much considered since the seminal works of Serrin and Gidas, Ni, and Nirenberg. In this talk, we do not discuss them. We do consider symmetry/break of symmetry and rigidity questions, but in another geometric setting: cylinders.

We begin with some heuristic motivations for our study, with the hope of convincing those who are asking themselves "Ok, but why *cylinders*?". Then, we illustrate many instances where cylindrical domains and one-dimensional solutions (i.e., solutions that depend solely on the axial coordinate) behave differently than their radial counterparts. Although we do not give any detailed proofs, we comment on the main ideas, which range from the hard-analysis of domain derivatives (which we introduce) to the more topological theory of bifurcation.

We refer those interested in spoilers to [1, 2, 3]

References

[1] Afonso, D. G., Iacopetti, A., Pacella, F. *Energy stability for a class of semilinear elliptic problems* Journal of Geometric Analysis (2024) 34-75

[2] Afonso, D. G. **Energy instability and overdetermined elliptic problems in cones and cylinders: an approach via domain variations** Ph.D. Thesis, Sapienza Università di Roma (2024)

[3] Afonso, D. G. *Semilinear equations in bounded cylinders: Morse index and bifurcation from one-dimensional solutions*, arXiv 231115236v2 (2024)