

# TOPOLOGY OF NODAL SETS OF SOLUTIONS TO ELLIPTIC PDES

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In these lectures [1] I will provide an introduction to the study of the topology of the nodal sets (i.e. the zero level sets) of solutions to second-order elliptic PDEs. In the first part, I will introduce a strategy based on two technical tools to address the analysis of these objects: Thom's isotopy theorem and a Runge-type global approximation theorem. In the second part, these techniques will allow us to construct solutions to a wide range of elliptic PDEs with nodal sets of complicated (sometimes bizarre) topologies. In particular, the model elliptic equation that I will consider to illustrate the power of these tools is the Helmholtz equation (monochromatic waves).

## REFERENCES

- [1] A. Enciso, D. Peralta-Salas, Topological aspects of critical points and level sets in elliptic PDEs. CIME Lecture Notes (Springer). Proceedings of the CIME School "Geometry of PDEs and related problems", Cetraro (Italy), June 2017.