



MARIE SKŁODOWSKA-CURIE POSTDOCTORAL FELLOWSHIPS 2024

EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

HOST INSTITUTION

Faculdade de Ciências e Tecnologias, Universidade Nova de Lisboa

RESEARCH GROUP AND URL

Analysis group at Center for Mathematics and Application (NOVA Math)

SUPERVISOR (NAME AND E-MAIL)

Fabio A. C. C. Chalub, facc@fct.unl.pt

SHORT CV OF THE SUPERVISOR

Ph.D. in Mathematics, Associate Professor at the Department of Mathematics, FCT NOVA. Working in mathematical biology, specially in mathematical models for evolution and epidemiology.

5 SELECTED PUBLICATIONS

- Matheus Hansen and Fabio A.C.C. Chalub. Population dynamics and games of variable size. J. Theor. Biol., 589:111842, 2024.
- Fabio A. C. C. Chalub, Antonio Gómez-Corral, Martín López-García, and Fátima Palacios-Rodríguez. A Markov chain model to investigate the spread of antibiotic-resistant bacteria in hospitals. Stud. Appl. Math., 151(4):1498–1524, 2023.
- Fabio A. C. C. Chalub, Léonard Monsaingeon, Ana Margarida Ribeiro, and Max O. Souza. Gradient flow formulations of discrete and continuous evolutionary models: A unifying perspective. Acta Appl. Math., 171(1):24, Feb 2021.
- Fabio A. C. C. Chalub and Max O. Souza. From fixation probabilities to d-player games: An inverse problem in evolutionary dynamics. Bull. Math. Biol., 81(11):4625–4642, Nov 2019.
- Fabio A.C.C. Chalub and Max O. Souza. Fitness potentials and qualitative properties of the Wright-Fisher dynamics. J. Theor. Biol., 457:57 – 65, 2018.

PROJECT TITLE AND SHORT DESCRIPTION

Games of Variable Size, theory and applications. In a recent publication (cf. [1], above), M. Hansen and the applicant introduced the concept of Variable Size Game Theory (VSGT), a variant of traditional game theory in which the number of players is a strategic definition of the players. In the original publication, three applications to biology were made (the origins of eusociality, sympatric speciations, and epidemiologic/compartamental models derived from VSGT). At this point it is clear that there is room for many more applications (e.g., study of haplodiplontic cycles, parent-offspring conflict, etc) and also for more detailed study of the relations between VSGT and compartmental models. In particular, it would be interesting to relate traditional equilibria concepts in game theory (Nash equilibria, omega-limits of the replicator equations, evolutionary stable strategies) to relevant equilibria in epidemiology (disease-free and endemic equilibria).

SCIENTIFIC AREA WHERE THE PROJECT FITS BEST*

Mathematics (MAT)