

Centro de Investigação em Matemática e Aplicações
Departamento de Matemática
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Seminário (online) 6/10/2021, 15H

**Stochastic differential equations: brief
introduction and profit optimization in fisheries**

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Abstract We start by a sketchy beginner's introduction to stochastic differential equations, followed by its application in modelling the growth of a fish population in an environment subjected to random fluctuations. If the population is being harvested, we look at the effects of several fishing policies. In particular, we take a special look at constant effort policies, determining conditions on the fishing effort to ensure non-extinction of the population and the existence of a stationary density (a stochastic equilibrium) and determining the effort that maximizes the profit from the fishing activity. We also briefly allude to work by (and joint work with) Nuno M. Brites on profit optimization and pros and cons of stochastic optimal control theory and different types of fishing policies.

This seminar is partially supported by Centro de Investigação em Matemática e Aplicações (CIMA), through the Project UIDB/04674/2020 of FCT-Fundação para a Ciência e a Tecnologia, Portugal