

Online Seminar on Chemotaxis

Date: 17th of October 2024 10:00 – 11:00 in “Central EU (summer time)” hour
16:00 – 17:00 in “Beijing” hour
17:00 – 18:00 in “Seoul–Tokyo” hour

Speaker: María Ángeles Rodríguez Bellido (Universidad de Sevilla)

Title: Optimal Control for some chemotaxis systems: difficulties and results.

Abstract:

Chemotaxis is a biological process in which a living organism moves spatially in response to the stimulus of a chemical substance (attractive or repulsive). Since the work of E.F. Keller & L.A. Segel [J. Theo. Biol. Vol. 26, (1970), 399-415], many mathematical models have attempted to reproduce the behaviour of both variables in this process (e.g. cell density of a living organism and chemical concentration), incorporating other interactions such as chemical production and/or consumption by the cells, cell degradation or logistic growth. A comprehensive review on this topic can be found in [Bellomo et al., Math. Models Methods Appl. Sci. 25 (2015), 9, 1663-1763].

In this talk we will focus on the approach of an optimal control problem for a class of chemotaxis systems. We will analyse the difficulties in achieving our objective, as well as the main results obtained.

The talk is based on the following works:

- [1] P. Braz e Silva, F. Guillén-González, C.F. Perusato, M.A. Rodríguez-Bellido. Bilinear Optimal Control of the Keller-Segel Logistic Model in 2D-Domains. Applied Mathematics & Optimization (2023), 87:55.
- [2] F. Guillén-González, E. Mallea-Zepeda, M.A. Rodríguez-Bellido. Optimal bilinear control problem related to a chemo-repulsion system in 2D domains, ESAIM Control Optim. Calc. Var. 26 (2020), Paper No. 29, 21.
- [3] F. Guillén-González, E. Mallea-Zepeda, M.A. Rodríguez-Bellido. A regularity criterion for a 3D chemo-repulsion system and its application to a bilinear optimal control problem, SIAM J. Control Optim. 58, 3 (2020), pp. 1457-1490.

Seminar website: <http://www.math.tohoku.ac.jp/~fujie/OSC.html>

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