CONTROL METASTATIC TUMOR GROWTH: FROM MODELING TO NUMERICAL RESULTS

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Cancer is the second most common global cause of death. Modeling metastatic tumor growth with treatment is of paramount importance in developing and advancing knowledge about curing cancer.

One possible approach to model metastatic tumor growth, including also the treatment, is via a coupled size-structured partial differential equation (PDE) and a system of ordinary differential equations (ODEs), the first one describing the evolution in time and size of the metastatic density and the second one describing the evolution in time of the sizes of the primary and secondary tumors, respectively.

The coupled PDE-ODE model, used to describe the metastatic tumor growth, can be reformulated in terms of VIE, whose unknowns are biological observables, such as the cumulative number of metastases and the total metastatic mass.

In this talk I will present a metastatic tumor growth model, which considers the control of the disease by assuming different types of treatment, and an efficient numerical method for the resolution of Volterra integral equations of the second type obtained from the model reformulation, [1], [2].

References

[1] I.M. Bulai, M.C. De Bonis, C. Laurita, *Numerical solution of metastatic tumor growth models with treatment*, Applied Mathematics and Computation, 484, 128988, 2025.

[2] I.M. Bulai, M.C. De Bonis, C. Laurita, *A new MATLAB software for numerical computation of biological observables for metastatic tumor growth*, Mathematics and Computers in Simulation, 234, 31-49, 2025.