Analysis Seminar

A Mathematical Model for Tracking Malignancy in the Human Brain

By

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Abstract: More than 120 different types of tumors can be found in the human brain. In this talk, we focus on mathematical modeling of glioblastoma growth, which is the most aggressive variant among primary brain tumors known as diffuse gliomas. We first provide a biological and theoretical foundation for the mathematical modeling of glioma growth, and then present a novel mathematical model – a time-fractional partial differential equation – to track the recurrence periods of glioblastoma patients.
At the outset, we discuss the operating dynamics of the proposed model. Considering the frequent recurrence periods in glioblastoma cases, we then monitor the tumor mass formation expected to occur during these periods and provide predictions of the timing when the tumor reappears on medical imaging to better understand the recurrence patterns. Ultimately, we discuss the stability, consistency, and convergence analyses for the numerical method used to solve the proposed mathematical model.

Date: Monday, April 7, 2025
Time: 15:30-16:30
Place: Mathematics Seminar Room, SA – 141