A hybrid model of cell migration in zebrafish embryogenesis

Roberto Natalini, Istituto per le Applicazioni del Calcolo - Consiglio Nazionale delle Ricerche, Roma

Abstract: In this talk we present a discrete in continuous mathematical model for the morphogenesis of the posterior lateral line system in zebrafish. Our model follows closely the results obtained in recent biological experiments. We rely on a hybrid description: discrete for the cellular level and continuous for the molecular level. We prove the existence of steady solutions consistent with the formation of particular biological structure, the neuromasts. Dynamical numerical simulations are performed to show the behavior of the model and its qualitative and quantitative accuracy to describe the evolution of the cell aggregate. Some analytical results and some related models, applied to the behavior of cardiac stem cells, will be also presented.