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Preface

The workshop of mathematics applied to life sciences (WMLS) was organized by the Laboratory of Biomathematics LBIOMATH and Mathematics Department of Djillali LIABES University (September 14–16th 2014, Sidi Bel-Abbes, Algeria). For our university, it was the first event dedicated to biomathematics. It was also an opportunity for a hundred participants to animate this multidisciplinary event, which could bring together mathematicians, statisticians, physicists, chemists, biologists and computer scientists as they worked together on natural phenomena. This volume contains selected works presented in the workshop WMLS. It concerns theoretical analysis and numerical simulations of various biological phenomena in morphogenesis, population dynamics and human diseases. The first work by R. Dilão is devoted to a reaction-diffusion model describing the development of fruit fly Drosophila. In the next paper A. Bouchnita et al. develop a hybrid discrete-continuous multi-scale model in order to study red blood cell production in the bone marrow. L. Matar Tine studies a size structured cell population model where the inverse problem for cell division rate in population dynamics is analyzed. Pulsed chemotherapy for heterogeneous tumor is considered by A. Lakmeche with coauthors. Conditions for disease eradication and persistence are found. The next two papers deal with modeling of leukemia. In the first one is a new model is suggested. This study is focused on the influence of death rates on the stability of equilibrium steady states of the system under consideration. The second of these papers treats a model inspired by those developed by Michor. In the next work, F. Boukhalfa et al. study existence and stability of solutions in a model of leishmania disease. A predator-prey model with state dependent impulse effects is analyzed by F. Charif with coauthors. Existence and stability of periodic solutions is proved. Finally, the last paper concerns a model of prion diseases constituted by impulsive differential equation and partial differential equation describing the production of monomers and evolution of polymers, respectively. The authors use the theory of evolution semi-group to prove existence of solutions.

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