Contribution ID: **31**   Type: **Contributed talk**

The mechanics of domain formation in the gene expression profiles

Wednesday, 29 September 2021 10:30 (20 minutes)

In embryo development, cells specialize into their future role by changing their gene expression levels in response to the concentrations of competing chemical signals, called morphogens. This paradigm is known as Wolpert's French flag model. In the mathematical modelling of these phenomena, a profound role is played by the reaction-diffusion equations involving some form of activation term (i.e. the Hill function). Yet, even the numerical analysis of these models is usually challenging due to their non-linear nature and large number of parameters involved. In this presentation, I will discuss the analytical solution to the generic model of domain formation, based on diffusion equations with a theta Heaviside activation term. The solution reveals a phase transition in the domain formation and allows for an exact insight into the dynamics of activation fronts and the conditions for stabilization of activated domains. This will be discussed using the example of two mutually repressive genes.

Primary author: MAJKA, Maciej (Jagiellonian University)

Presenter: MAJKA, Maciej (Jagiellonian University)

Session Classification: S7