

## **The reaction-diffusion-mobility model for protein concentration dynamics**

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We propose the refinement of modelling of protein concentration dynamics in space (long range diffusion), leading to the 3d order equation, together with the refinement of them in time (by the time delay or relaxation), which results in the hyperbolic reaction-diffusion equation. The combination of these improvements is based on general concepts of extended irreversible thermodynamics. It allows us to derive the new reaction-diffusion-mobility (RDM) model. We show that both additions to the classic approach are necessary, and the RDM leads to a new approach in mathematical modelling of protein concentration dynamics, free of some inconsistencies typical for parabolic or hyperbolic reaction-diffusion equations. The examples of the new description of gene expression dynamics in early development of *Drosophila* embryo are considered.