NON-ARCHIMEDEAN REACTION-ULTRADIFFUSION EQUATIONS AND COMPLEX HIERARCHIC SYSTEMS

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We will discuss about non-Archimedean reaction-ultradiffusion equations and their connections with models of complex hierarchic systems.From a mathematical perspective, the equations studied here are the p-adic counterpart of the integro-differential models for phase separation introduced by Bates and Chmaj. Our equations are also generalizations of the ultradiffusion equations on trees studied in the 's80 by Ogielski, Stein, Bachas, Huberman, among others, and also generalizations of the master equations of the Avetisov et al. models, which describe certain complex hierarchic systems. From a physical perspective, our equations are gradient flows of non-Archimedean free energy functionals and their solutions describe the macroscopic density profile of a bistable material whose space of states has an ultrametric structure. Some of our results are p-adic analogs of some well-known results in the Archimedean settting, however, the mechanism of diffusion is completely different due to the fact that it occurs in an ultrametric space. The talk will be based on reference [2].

References

[1] Khrennikov Andrei, Kozyrev Sergei, Zúñiga-Galindo W. A., Ultrametric Equations and its Applications. Encyclopedia of Mathematics and its Applications. Cambridge University Press. In press.
[2] Zúñiga-Galindo W. A., Non-Archimedean Reaction-Ultradiffusion Equations and Complex Hierarchic Systems. arXiv:1604.06471.

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