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Turing type bifurcation in reaction-diffusion models with nonlocal dispersal

In reaction-diffusion models describing biological and chemical interactions, some dispersal and interaction can be of nonlocal nature. We show that when a nonlocal dispersal occurs instead of classical diffusion, how the mechanism of Turing diffusion-induced instability and pattern formation changes. It is shown that Turing type instability and associated spatial patterns can be induced by fast nonlocal inhibitor dispersal and slow activator diffusion, and slow nonlocal activator dispersal also causes instability but may not produce stable spatial patterns. The existence of nonconstant positive steady states is shown through bifurcation theory. This suggests a new mechanism for spatial pattern formation, which has a different instability parameter regime compared to the Turing mechanism. This talk is based on joint work with Shanshan Chen, Xiaoli Wang and Guohong Zhang.