

ANALYSIS AND DIFFERENTIAL GEOMETRY SEMINAR

Quantitative stability of traveling waves

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Abstract: In their original paper, Kolmogorov, Petrovsky, and Piskunov demonstrated stability of the minimal speed traveling wave with an ingenious compactness argument based on, roughly, the decreasing steepness of the profile. This proof is extremely flexible, yet entirely not quantitative. On the other hand, more modern PDE proofs of this fact for general reaction-diffusion equations are highly tailored to the particular equation, fairly complicated, and often not sharp in the rate of convergence. In this talk, which will be elementary and self-contained, I will introduce a natural quantity, the shape defect function, that allows a simple approach to quantifying convergence to the traveling wave for a large class of reaction-diffusion equations. Connections to the calculus of variations and generalizations to other settings will be discussed. This is a joint work with Jing An and Lenya Ryzhik.

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