Entire solutions with and without radial symmetry in balanced bistable reaction-diffusion equations

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Let $n \geq 2$ be a given integer. We assert that an n-dimensional traveling front converges to an $(n-1)$-dimensional entire solution as the speed goes to infinity in a balanced bistable reaction-diffusion equation. As the speed of an n-dimensional axially symmetric or asymmetric traveling front goes to infinity, it converges to an $(n-1)$-dimensional radially symmetric or asymmetric entire solution in a balanced bistable reaction-diffusion equation, respectively. We conjecture that the radially asymmetric entire solutions are associated with the ancient solutions called the Angenent Ovals in the mean curvature flows.

References

[1] H. Ninomiya and M. Taniguchi, *Traveling front solutions of dimension n generate entire solutions of dimension* $(n-1)$ *in reaction-diffusion equations as the speeds go to infinity*, *Archive for Rational Mechanics and Analysis*, Volume 249, article number 13, (2025).

[2] M. Taniguchi, *Axially asymmetric traveling fronts in balanced bistable reaction-diffusion equations*, Ann. Inst. H. Poincaré Anal. Non Linéaire **36** (2019), no. 7, 1791–1816.

[3] M. Taniguchi, *Axisymmetric traveling fronts in balanced bistable reaction-diffusion equations*, Discrete and Continuous Dynamical Systems. Series A, 40(6), (2020) 3981-3995.

[4] M. Taniguchi, *Entire solutions with and without radial symmetry in balanced bistable reaction-diffusion equations*, Mathematische Annalen, 390(3) (2024), 3931-3967.

[5] M. Taniguchi, *Polyhedral entire solutions in reaction-diffusion equations*, *Journal of Differential Equations*, 429(5) (2025), 529–565.