On traveling waves for anisotropic curve shortening flow with external driving force

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Curve shortening flow with external driving force appears in various mathematical problems. For instance, mathematical models describing physical and biological phenomena such as motion of soap films and grain boundaries (mean curvature flows). Moreover we can confirm that the shortening flow appears as singular limit problems of various reaction diffusion systems, e.g., FitzHugh-Nagumo equations, Lotka-Volterra equations and so on.

In this talk, we study traveling wave solutions for anisotropic curve shortening flow with external driving force. Here we focus on the traveling waves composed of Jordan curves. This motivation is important when we study cell locomotion and oil droplet motion. Our aim is to investigate the condition of external driving force for existence of traveling waves to the curve shortening flow. By using this results, we show the existence of traveling waves for some interface equations and free boundary problems. This is a joint work with Professor Hirokazu Ninomiya in Meiji University.