On a gradient flow of plane curves minimizing the isoperimetric ratio in the relative geometry

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We analyze a gradient flow of closed planar curves minimizing the soperimetric ratio in the relative Finsler geometry. For such a flow the normal velocity is a function of the anisotropic curvature and it also depends on the total interfacial energy and enclosed area of the curve. The governing system of equations consists of nonlinear parabolic equations with nonlocal terms. In contrast to the gradient flow for the isoperimetric ratio, we show there exist initial curves for which the enclosed area is decreasing with respect to time. We also derive a mixed anisoperimetric inequality for the product of total interfacial energies corresponding to different anisotropy functions. Finally, we present several computational examples illustrating theoretical results. This is a joint work with Shigetoshi Yazaki.

References

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