Dirr, N.; **Karali, G.**; **Yip, N. K.**

Pulsating wave for mean curvature flow in inhomogeneous medium. (English) Zbl 1185.53076

Eur. J. Appl. Math. 19, No. 6, 661-699 (2008).

In the present study the authors deal with the mean curvature flow of a hypersurface in a periodic inhomogeneous medium. More precisely, they consider the evolution $\{\Gamma(t) \subset \mathbb{R}^{n+1} \mid t \geq 0\}$ of an n-dimensional surface with its motion law given by

$$V_N(p) = H(p) + \delta f(p),\ p \in \Gamma(t), \tag{1}$$

where V_N and H are the normal velocity and mean curvature of $\Gamma(t)$, and δ is a positive number which measures the strength of the spatial inhomogeneity, represented by $f : \mathbb{R}^{n+1} \to \mathbb{R}$. Under rather weak assumptions on the data of (1), the authors are able to show for any direction $\vec{\nu}$ the existence of a unique speed c_ν and a number $D < \infty$ such that the solution of (1) starting from a plane with normal $\vec{\nu}$ stays as a graph over the same plane for all times, and moreover, this graph lies within a distance D from a plane which has normal $\vec{\nu}$ and moves with normal velocity c_ν. Furthermore, if $c_\nu \neq 0$, the authors show that pulsating waves exist.

Reviewer: Messoud A. Efendiev (Berlin)

MSC:

53C44	Geometric evolution equations (mean curvature flow, Ricci flow, etc.) (MSC2010)
76D05	Navier-Stokes equations for incompressible viscous fluids
35Q30	Navier-Stokes equations

Keywords:
mean curvature flow; inhomogeneous medians; pulsating wave

Full Text: DOI

References:

[1] DOI: 10.1016/j.anihpc.2004.10.009 · Zbl 1135.35092 · doi:10.1016/j.anihpc.2004.10.009
[2] DOI: 10.1007/s000300050029 · Zbl 0887.35070 · doi:10.1007/s000300050029
[3] Huisken, J. Diff. Geom. 20 pp 237– (1984)
[4] Friedman, Pacific J. Math. 8 pp 201– (1958) · Zbl 0103.06403 · doi:10.2140/pjm.1958.8.201
[5] Evans, J. Geom. Anal. 2 pp 121– (1992) · Zbl 0768.53003 · doi:10.1007/BF02921385
[6] DOI: 10.1007/978-3-7643-7719-9_13 · doi:10.1007/978-3-7643-7719-9_13
[7] Evans, J. Differential Geom. 33 pp 635– (1991)
[8] DOI: 10.1090/S0273-0979-1992-00266-5 · Zbl 0755.35015 · doi:10.1090/S0273-0979-1992-00266-5
[9] DOI: 10.1007/BF01232278 · Zbl 0707.53008 · doi:10.1007/BF01232278
[10] Chen, J. Diff. Geom. 33 pp 749– (1991)
[11] DOI: 10.2307/1971452 · Zbl 0696.53036 · doi:10.2307/1971452
[12] Dirr, Interfaces Free Bound. 8 pp 79– (2006)
[13] Cahn, SIAM J. Appl. Math. 59 pp 455– (1999)
[14] Dirr, Interfaces Free Bound. 8 pp 47– (2006)
[15] DOI: 10.1002/cpa.10008 · Zbl 1036.49040 · doi:10.1002/cpa.10008
[16] Bhattacharya, Interfaces Free Bound. 6 pp 151– (2004)
[17] Bhattacharya, Proc. Royal. Soc. Edin. 133A pp 773– (2003)
[18] Allen, Acta Metall. 27 pp 1084– (1979) · doi:10.1016/0001-6160(79)90196-2

[19] DOI: 10.1002/cpa.20046 · Zbl 1065.49011 · doi:10.1002/cpa.20046

[20] Phillips, Crystals, Defects and Microstructures (2001) · doi:10.1017/CBO9780511606236

[21] Korevaar, Proc. Sympos. Pure Math. Part 2, Amer. Math. Soc. 45 pp 81– (1986) · doi:10.1090/pspum/045.2/843597

