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Diffusion-induced blowup solutions for the shadow limit model of a singular Gierer-Meinhardt system. (English) [Zbl 1477.35043](#)

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MSC:

- 35B44 Blow-up in context of PDEs
- 35B40 Asymptotic behavior of solutions to PDEs
- 35K20 Initial-boundary value problems for second-order parabolic equations
- 35K58 Semilinear parabolic equations
- 35R09 Integro-partial differential equations

Keywords:

diffusion driven blowup; blowup profile; Gierer-Meinhardt model; shadow system; Turing instability; nonlocal parabolic equation

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References:

- [1] Bobrowski, A. and Kunze, M., Irregular convergence of mild solutions of semilinear equations, *J. Math. Anal. Appl.*472 (2019) 1401-1419. · [Zbl 1411.34085](#)
- [2] Bressan, A., Stable blow-up patterns, *J. Differential Equations*98 (1992) 57-75. · [Zbl 0770.35010](#)
- [3] Bricmont, J. and Kupiainen, A., Universality in blow-up for nonlinear heat equations, *Nonlinearity*7 (1994) 539-575. · [Zbl 0857.35018](#)
- [4] O. Drosinou, N. I. Kavallaris and C. V. Nikolopoulos, A study of a non-local problem with robin boundary conditions arising from MEMS technology, to appear in *Math. Methods Appl. Sci.* (2021), <https://doi.org/10.1002/mma.7393>. · [Zbl 1473.35340](#)
- [5] Duong, G. K., A blowup solution of a complex semi-linear heat equation with an irrational power, *J. Differential Equations*267 (2019) 4975-5048. · [Zbl 1428.35143](#)
- [6] Duong, G. K., Profile for the imaginary part of a blowup solution for a complex-valued semilinear heat equation, *J. Funct. Anal.*277 (2019) 1531-1579. · [Zbl 1417.35064](#)
- [7] Duong, G. K., Nguyen, V. T. and Zaag, H., Construction of a stable blowup solution with a prescribed behavior for a non-scaling-invariant semilinear heat equation, *Tunis. J. Math.*1 (2019) 13-45. · [Zbl 1407.35092](#)
- [8] G. K. Duong, N. Nouaili and H. Zaag, Construction of blow-up solutions for the complex Ginzburg-Landau equation with critical parameters, to appear in *Mem. Amer. Math. Soc.* (2021).
- [9] Duong, G. K. and Zaag, H., Profile of a touch-down solution to a nonlocal MEMS model, *Math. Models Methods Appl. Sci.*29 (2019) 1279-1348. · [Zbl 1425.35116](#)
- [10] Ghoul, T., Nguyen, V. T. and Zaag, H., Construction and stability of blowup solutions for a non-variational semilinear parabolic system, *Ann. I. H. Poincaré AN.*35(6) (2018) 1577-1630. · [Zbl 1394.35222](#)
- [11] Gierer, A. and Meinhardt, H. A., Theory of biological pattern formation, *Kybernetik.*12 (1972) 30-39. · [Zbl 1434.92013](#)
- [12] Giga, Y. and Kohn, R. V., Asymptotically self-similar blow-up of semilinear heat equations, *Comm. Pure Appl. Math.*38 (1985) 297-319. · [Zbl 0585.35051](#)
- [13] Giga, Y. and Kohn, R. V., Nondegeneracy of blowup for semilinear heat equations, *Comm. Pure Appl. Math.*42 (1989) 845-884. · [Zbl 0703.35020](#)
- [14] Guo, J. and Souplet, P., No touchdown at zero points of the permittivity profile for the MEMS problem, *SIAM J. Math. Anal.*47 (2015) 614-625. · [Zbl 1332.35160](#)
- [15] Guo, J. S. and Kavallaris, N. I., On a nonlocal parabolic problem arising in electrostatic MEMS control, *Discrete Contin. Dyn. Syst.*32 (2012) 1723-1746. · [Zbl 1243.35009](#)
- [16] Kavallaris, N. I., Barreira, R. and Madzvamuse, A., Dynamics of shadow system of a singular gierer-meinhardt system on an evolving domain, *J. Nonlinear Sci.*31(5) (2021), <https://doi.org/10.1007/s00332-020-09664-3>. · [Zbl 1462.35033](#)
- [17] Kavallaris, N. I., Lacey, A. A. and Nikolopoulos, C. V., On the quenching of a nonlocal parabolic problem arising in electrostatic MEMS control, *Nonlinear Anal.*138 (2016) 189-206. · [Zbl 1334.35340](#)
- [18] N. I. Kavallaris and E. A. Latos, Diffusion-driven blow-up for a non-local fisher-kpp type model. Submitted (2019).

- [19] Kavallaris, N. I. and Suzuki, T., On the dynamics of a non-local parabolic equation arising from the Gierer-Meinhardt system, *Nonlinearity*30(5) (2017) 1734-1761. · [Zbl 1372.35138](#)
- [20] Kavallaris, N. I. and Suzuki, T., *Non-Local Partial Differential Equations for Engineering and Biology: Mathematical Modeling and Analysis*, , Vol. 31 (Springer, 2018). · [Zbl 1387.00004](#)
- [21] Mahmoudi, F., Nouaili, N. and Zaag, H., Construction of a stable periodic solution to a semilinear heat equation with a prescribed profile, *Nonlinear Anal.*131 (2016) 300-324. · [Zbl 1334.35145](#)
- [22] Marciniak-Czochra, A., Härting, S., Karch, G. and Suzuki, K., Dynamical spike solutions in a nonlocal model of pattern formation, *Nonlinearity*31 (2018) 1757-1781. · [Zbl 1391.35289](#)
- [23] Marciniak-Czochra, A. and Mikelić, A., Shadow limit using renormalization group method and center manifold method, *Vietnam J. Math.*45 (2017) 103-125. · [Zbl 1376.37116](#)
- [24] Masmoudi, N. and Zaag, H., Blow-up profile for the complex Ginzburg-Landau equation, *J. Funct. Anal.*255 (2008) 1613-1666. · [Zbl 1158.35016](#)
- [25] Merle, F., Solution of a nonlinear heat equation with arbitrarily given blow-up points, *Comm. Pure Appl. Math.*45 (1992) 263-300. · [Zbl 0785.35012](#)
- [26] Merle, F. and Zaag, H., Reconnection of vortex with the boundary and finite time quenching, *Nonlinearity*10 (1997) 1497-1550. · [Zbl 0910.35020](#)
- [27] Merle, F. and Zaag, H., Stability of the blow-up profile for equations of the type $(u_t = \Delta u + |u|^{p-1}u)$, *Duke Math. J.*86 (1997) 143-195. · [Zbl 0872.35049](#)
- [28] V. T. Nguyen and H. Zaag, Construction of a stable blow-up solution for a class of strongly perturbed semilinear heat equations, to appear in *Ann. Scuola Norm. Sup. Pisa Cl. Sci.* · [Zbl 1378.35178](#)
- [29] Nouaili, N. and Zaag, H., Profile for a simultaneously blowing up solution to a complex valued semilinear heat equation, *Comm. Partial Differential Equations*40 (2015) 1197-1217. · [Zbl 1335.35126](#)
- [30] Nouaili, N. and Zaag, H., Construction of a blow-up solution for the complex Ginzburg-Landau equation in some critical case, *Arch. Ration. Mech. Anal.*228(3) (2018) 995-1058. · [Zbl 1397.35295](#)
- [31] S. Tayachi and H. Zaag, Existence of a stable blow-up profile for the nonlinear heat equation with a critical power nonlinear gradient term, to appear *Trans. Amer. Math. Soc.*371 (2019) 5899-5972. · [Zbl 1423.35186](#)
- [32] Turing, A. M., The chemical basis of morphogenesis, *Philos. Trans. R. Soc.*237 (1952) 37-72. · [Zbl 1403.92034](#)
- [33] Yang, X. and Zhang, T., Estimates of heat kernels with Neumann boundary conditions, *Potential Anal.*38 (2013) 549-572. · [Zbl 1262.35115](#)

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