

Wu, Di; Yang, Wenbin

Analysis on bifurcation solutions of an atherosclerosis model. (English) Zbl 1379.35338
Nonlinear Anal., Real World Appl. 39, 396-410 (2018).

Summary: This paper is concerned with the inflammatory process model resulting in the development of atherosclerosis subject to no-flux boundary conditions. The dissipation and persistence of the system are obtained. The steady-state bifurcations are also studied in two cases. The bifurcation from the simple eigenvalue can be extended to infinity by increasing d_2 to infinity, and the bifurcation from the double eigenvalue is intensively investigated. The techniques include the spectrum analysis of operators, the bifurcation theory, space decompositions and the implicit function theorem.

MSC:

35Q92 PDEs in connection with biology, chemistry and other natural sciences
35B32 Bifurcations in context of PDEs
92C50 Medical applications (general)

Cited in 1 Document

Keywords:

atherosclerosis; dynamics; bifurcation; coexistence; reaction-diffusion equations

Full Text: [DOI](#)

References:

- [1] Ross, R., Atherosclerosis - an inflammatory disease, *N. Engl. J. Med.*, 340, 115-126, (1999)
- [2] Osterud, B.; Bjorklid, E., Role of monocytes in atherogenesis, *Physiol. Rev.*, 83, 1069-1112, (2003)
- [3] Steinberg, D., Low density lipoprotein oxidation and its pathobiological significance, *J. Biol. Chem.*, 272, 20963-20966, (1997)
- [4] Navab, M.; Berliner, J.; Watson, A., The yin and Yang of oxidation in the development of the fatty streak: a review based on the 1994 George Lyman Duff Memorial Lecture, *Arterioscler. Thromb. Vasc. Biol.*, 16, 831-842, (1996)
- [5] Li, Z.; Howarth, S.; Tang, T.; Gillard, J., How critical is fibrous cap thickness to carotid plaque stability? A flow-plaque interaction model, *Stroke*, 37, 1195-1199, (2006)
- [6] Khatib, N.; Genieys, S.; Volpert, V., Atherosclerosis initiation modeled as an inflammatory process, *Math. Model. Nat. Phenom.*, 2, 126-141, (2007) · [Zbl 1337.92108](#)
- [7] Khatib, N.; Genieys, S.; Kazmierczak, B.; Volpert, V., Reaction-diffusion model of atherosclerosis development, *J. Math. Biol.*, 65, 349-374, (2012) · [Zbl 1252.35156](#)
- [8] Liu, W.; Li, Y., Research on steady-state solutions for a atherosclerosis initiation model, *Basic Sci. J. Text. Univ.*, 26, 468-473, (2013)
- [9] Lou, Y.; Ni, W. M., Diffusion, self-diffusion and cross-diffusion, *J. Differential Equations*, 131, 79-131, (1996) · [Zbl 0867.35032](#)
- [10] Smoller, J., *Shock Waves and Reaction-Diffusion Equations*, (2012), Springer-Verlag New York
- [11] Wu, J., Global bifurcation of coexistence state for the competition model in the chemostat, *Nonlinear Anal.*, 39, 817-835, (2000) · [Zbl 0940.35114](#)
- [12] Blat, J.; Brown, K., Global bifurcation of positive solutions in some systems of elliptic equations, *SIAM J. Math. Anal.*, 17, 1339-1353, (1986) · [Zbl 0613.35008](#)
- [13] Wu, J.; Ma, C.; Guo, G., The effect of interaction ratio in a chemical reaction, *IMA J. Appl. Math.*, 78, 1265-1289, (2013) · [Zbl 1284.35452](#)
- [14] Blake, G.; Otvos, J.; Rifai, N.; Ridker, P., Low-density lipoprotein particle concentration and size as determined by nuclear magnetic resonance spectroscopy as predictors of cardiovascular disease in women, *Circulation*, 106, 1930-1937, (2002)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.