ISSN:2372-0743 print
ISSN:2373-2989 on line
International Journal of Ground Sediment & Water
Vol. 17
2023

•Research Paper •

DOI: 10.5281/zenodo.7619195

Gierer-Meinhardt nonlinear system for pattern formation: An analytical and computational approach

Zakir Hossine [1], Afia Farzana [2], Md. Abdur Rafe [3], and Md. Kamrujjaman [4*]

[1,2,3]Department of Applied Mathematics, University of Dhaka, Dhaka 1000, Bangladesh

[4]Department of Mathematics, University of Dhaka, Dhaka 1000, Bangladesh

*Corresponding author Email : kamrujjaman@du.ac.bd

Abstract: In the universe, an infinite number of patterns are visible, which is the premier beauty of nature. Mathematical modeling is a powerful tool to decorate the patterns in scientific computation. This paper studied the Gierer-Meinhardt reaction-diffusion model of pattern formation to visualize a class of patterns for different animals and plants. It is also noted that many biological and chemical phenomena can be explained using the Gierer-Meinhardt model. We have analyzed the linear stability to get the stability and instability conditions of a system of reaction-diffusion equations with diffusion and in the absence of diffusion. Finally, as an application, a series of different types of patterns are presented using numerical simulation of the model.

Keywords: Gierer-Meinhardt Model; stability analysis; Turing pattern; reaction-diffusion; numerical analysis.

This paper DOI: 10.5281/zenodo.7619195

Journal Old Website: http://ijgsw.comze.com/ is no longer used

Journal New Website: https://ijgsw.net/
You can submit your paper to email: Jichao@email.com
Or IJGSW@mail.com