# Review of: "Time evolution and convergence of simple migration models"

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Potential competing interests: No potential competing interests to declare.

Comments

Major comments

1. In this paper, the author study two most fundamental migration models, Gravity model and Radiation model numerically using different boundary conditons, grid sizes and shapes to investigate the long term trends of these models. In section II, fig.1 displays the flow-ratio from origin to destination and it is shown that there can be two steady states depending on the value of \alpha and \beta. My question is, can one check the stability of these two steady states and relate the convergence time to the parameter \gamma, A, d_ij.

2. The study of radiation model with discrete boundary condition yields the system converges towards a population distribution in the centre and a decaying number of populations when moving away from the centre i.e the steady state is Gaussian distribution. The fitted parameter in equation .6 obtained for different grid sizes. Will the value of a & b converge to any certain value when you increase the grid size? Do the values differ for different grid shapes?

3. To investigate the state's stability you mentioned to calculate the Lyapunov exponent, but in the later part there is no explanation for that. The value of Eigen values of the Jacobian are positive initially and turns to negative for long run. So, is there any cross-over time after which the external perturbation decays?

Minor comments

1. It is mentioned that the flow ratio (equation-2) is displayed in fig.2. But as I can see, it is fig. 1 not fig.2.

2. In fig.6 , the visualisation is not so clear i.e as it is mentioned the population distribution consists of two square areas connected by a small corridor.

In conclusion , I found the paper is well structured and interesting overall.