Epidemic Spread in Populations at Demographic Equilibrium

Karen R. Ríos-Soto, Carlos Castillo-Chavez, Michael G. Neubert, Edriss S. Titi and Abdul-Aziz Yakubu

Abstract. We introduce an integrodifference equation model to study the spatial spread of epidemics through populations with overlapping and non-overlapping epidemiological generations. Our focus is on the existence of travelling wave solutions and their minimum asymptotic speed of propagation c^*. We contrast the results here with similar work carried out in the context of ecological invasions. We illustrate the theoretical results numerically in the context of SI (susceptible-infected) and SIS (susceptible-infected-susceptible) epidemic models.

2000 *Mathematics Subject Classification.* 92D30, 92D25, 45G10, 39A10.

Key words and phrases. discrete-time models, dispersal, epidemiology, integrodifference equations, travelling waves.

Department of Biological Statistics and Computational Biology, Cornell University, Ithaca, NY 14853

Department of Mathematics and Statistics, Arizona State University, Tempe, AZ 85287

Biology Department, Woods Hole Oceanographic Institution, Woods Hole, MA 02543

Department of Mathematics and Department of Mechanical and Aerospace Engineering, University of California, Irvine, CA 92697 also Department of Computer Science and Applied Mathematics, Weizmann Institute of Science, Rehovot 76100, Israel

Department of Mathematics, Howard University, Washington DC, 20059