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Chaotic desynchronization of multistrain diseases LEAH SHAW, Naval Research Laboratory, LORA BILLINGS, Montclair State University, MARIE MCCRARY, Montclair State University, IRA SCHWARTZ, Naval Research Laboratory — Dengue fever, a multi-strain disease, has four distinct co-existing serotypes (strains). The serotypes interact by antibody-dependent enhancement (ADE), in which infection with a single serotype is asymptomatic, but contact with a second serotype leads to serious illness accompanied by greater infectivity. It has been observed from serotype data that outbreaks of the four serotypes occur asynchronously (Nisalak et al., Am. J. Trop. Med. Hyg. 68: 192). We developed a compartmental model and did bifurcation analysis for multiple serotypes with ADE. Both autonomous and seasonally driven versions were studied. For sufficiently small ADE, we find that the number of infectives of each serotype synchronizes, with outbreaks occurring in phase. However, when the ADE increases past a threshold, the system becomes chaotic, and infectives of each serotype desynchronize.

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