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Avner Peleg* (apeleg@buffalo.edu), Department of Mathematics, State University of New York at Buffalo, Buffalo, NY 14260, and **Quan Nguyen**, Department of Mathematics, State University of New York at Buffalo, Buffalo, NY 14260. *Population dynamics models for pulse dynamics in broadband fiber optics communication systems.*

We investigate the effects of Raman and two-photon-absorption crosstalk on the dynamics of pulse amplitudes in silica glass and silicon broadband transmission systems employing encoding with the phase. For Raman crosstalk we find that the dynamics is described by an N-dimensional predator-prey model and show that stable transmission can be achieved by a proper choice of the frequency profile of linear amplifier gain. For two-photon-absorption crosstalk we show that the dynamics is described by an N-dimensional model for competing species. In the latter case we find the conditions for stable transmission for a 2-dimensional system. (Received September 08, 2010)