1163-60-1438 **Barbara H Margolius***, Dept Mathematics, 1515 RT, 2121 Euclid Ave, 2121 Euclid Ave, Cleveland, OH 44115-2214. *Using generalized eigenvalues to analyze queueing models with Erlang arrivals and service and time-varying periodic transition rates.* Preliminary report.

We consider a stochastic process with Erlang arrivals and service. This is a quasi-birth-death process, that is, a stochastic process with a two-dimensional state space $X(t), J(t)$, where $X(t) in mathbb Z$ is the level of the process and (J(t)in1,2,dots,K) is the phase. Transitions are only possible within the current level or to an adjacent level. We are interested in such processes in which transition rates vary periodically and where the process is ergodic. In this case, we can analyze the system by studying the generalized eigenvalues of the generating function for the unbounded process over a single time period. This generating function will be a Laurent series whose coefficients are matrices. The (i, j)th component of the coefficient of z^k represents the probability of a transition from phase i to phase j and a net change of k levels in a single time period. Those values of z such that the determinant of this generating function are zeros are the generalized eigenvalues of the system. The probability generating function for the queue-length process and other performance measures of the system can be determined in terms of this generating function for the unbounded process. The generalized eigenvalues provide information about system asymptotics. (Received September 15, 2020)