

This technical note is concerned with the problems of stability and stabilization for a class of discrete-time semi-Markov jump linear systems (S-MJLSs). The discrete-time semi-Markov kernel (SMK) is introduced, where the probability density function of sojourn-time is dependent on both current and next system mode. As a consequence, different types of distributions and/or different parameters in a same type of distribution of sojourn-time, depending on the target mode towards which the system jumps, can coexist in each mode of a SMK. The underlying S-MJLSs are therefore more general than those considered in existing studies. A new stability concept generalizing the traditional mean-square stability is proposed such that numerically testable criteria on the basis of SMK are obtained. Numerical examples are presented to illustrate the validity and advantage of the developed theoretical results.