

## **Exponential stability of some interconnected stochastic control systems with non-trivial equilibria**

### **ABSTRACT**

This paper investigates the exponential stability of some interconnected stochastic control systems with non-trivial equilibria, for which the considered interconnected systems are induced by the composition of some stochastic subsystems. Of particular interest is the notion of stability with respect to a set containing the non-trivial equilibria. It is shown that the exponential stability of the interconnected or composite feedback control systems can be deduced from the stability of the isolated subsystems. Using the preliminary results concerning practical exponential stability of continuous-time stochastic systems that without a common equilibria, we present sufficient conditions for practical exponential stability of the composite system based upon a computable feedback law that would also render the set containing all non-trivial equilibrium solutions of each stochastic subsystem with the same stability. Finally, several illustrative examples are presented to show the applicability of the results.

**Keyword:** Exponential stability in probability; Composite stochastic control systems; Non-unique equilibria; Lyapunov technique