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## **Infinite Time Horizon Control of Linear Systems with Fractional Brownian Motions**

A control problem for a linear system with an ergodic (long run average) quadratic cost functional and an arbitrary fractional Brownian motion is solved by describing an explicit optimal control and the optimal cost. This optimal control is the sum of the well known linear feedback control for the associated infinite time horizon deterministic control problem and a prediction of the response of a system to the future fractional Brownian motion. The same methods can be applied to other ergodic control problems for linear systems with many other square integrable processes with stationary increments and continuous sample paths.