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# Finite-Dimensionality of Information States in Optimal Control of Stochastic Systems: A Lie Algebraic Approach.

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*Abstract*: In this paper we introduce the sufficient statistic algebra which is responsible for propagating the sufficient statistic, or information state, in the optimal control of stochastic systems. Certain Lie algebraic methods widely used in nonlinear control theory, are then employed to derive finite-dimensional controllers. The sufficient statistic algebra enables us to determine a priori whether there exist finite-dimensional controllers; it also enables us to classify all finite-dimensional controllers.

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