

# Approximate controllability for linear SDE with control acting on the noise

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## Abstract

In this paper we study approximate controllability for a linear stochastic differential equation

$$dy(t) = (Ay(t) + Bu(t)) dt + (Cy(t) + Du(t)) dW(t),$$

for the case when the control acts also on the noise. This may be considered as a generalization of [1] where the authors have solved the problem for  $D = 0$  and of [2] where  $D$  is of full rank. We prove, using the dual BSDE and Riccati methods that approximate controllability is equivalent to the local in time viability for a suitable set. Finally, an invariance criterion is given.

[1] Buckdahn, R., Quincampoix, M., Tessitore, G., *A Characterization of Approximately Controllable Linear Stochastic Differential Equations*, Stochastic Partial differential Equations and Applications, G. Da Prato and L. Tubaro Eds " Series of Lecture Notes in pure and appl. Math., Chapman & Hall Vol.245 (2006), pp. 253-260

[2] Peng, S.G., *Backward Stochastic Differential Equation and Exact Controllability of Stochastic Control Systems*, Progr. Natur. Sci. vol. 4, No. 3 (1994), pp. 274-284.

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