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On the excursion theory for linear diffusions

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Abstract. We present a number of important identities related to the excursion theory of linear diffusions. In particular, excursions straddling an independent exponential time are studied in detail. Letting the parameter of the exponential time tend to zero it is seen that these results connect to the corresponding results for excursions of stationary diffusions (in stationary state). We characterize also the laws of the diffusion prior and posterior to the last zero before the exponential time. It is proved using Krein's representations that, e.g. the law of the length of the excursion straddling an exponential time is infinitely divisible. As an illustration of the results we discuss the Ornstein–Uhlenbeck processes.

Keywords and phrases: Brownian motion, last exit decomposition, local time, infinite divisibility, spectral representation, Ornstein–Uhlenbeck process

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