On infinitely divisible semimartingales

Andreas Basse O’Connor, Department of Mathematics, Aarhus University

Stricker’s theorem gives a full characterization of Gaussian semimartingales, see [1983, *Z. Wahrsch. Verw. Gebiete* **64**(3)]. It states that a symmetric Gaussian process is a semimartingale if and only if it is the sum of an independent increment Gaussian process and a Gaussian process of finite variation. We consider generalizations of this result to infinitely divisible processes. First we show that the class of infinitely divisible semimartingales is so large that Stricker’s theorem does not hold in such generality. Then we identify the property, called the strict representability, such that Stricker’s theorem does hold for strictly representable infinitely divisible processes. Gaussian processes are strictly representable due to Hida’s multiplicity theorem. Using Basse-O’Connor and Rosinski [2013, *Stochastic Process. Appl*. **123**(6)] we characterize semimartingales within the class of stationary increment mixed moving averages; this class includes linear fractional process and mixed moving averages as particular cases. The proof of the main result relies on the uniform convergence of series representations of cadlag infinitely divisible processes established in Basse-O’Connor and Rosinski [2013, *Ann. Probab.* **41**(6)].

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