MULTIVARIATE GENERALIZED ORNSTEIN-UHLENBECK PROCESSES

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De Haan and Karandikar [2] introduced generalized Ornstein–Uhlenbeck processes as one-dimensional processes $(V_t)_{t\geq 0}$ which are basically characterized by the fact that for each $h > 0$ the equidistantly sampled process $(V_{nh})_{n\in\mathbb{N}_0}$ satisfies the random recurrence equation $V_{nh} = A_{(n-1)h,nh}V_{(n-1)h} + B_{(n-1)h,nh}$, $n \in \mathbb{N}$, where $(A_{(n-1)h,nh}, B_{(n-1)h,nh})_{n\in\mathbb{N}}$ is an i.i.d. sequence with positive $A_{0,h}$ for each $h > 0$. We generalize this concept to a multivariate setting and use it to define multivariate generalized Ornstein–Uhlenbeck (MGOU) processes which occur to be characterized by a starting random variable and some Lévy process (X, Y) in $\mathbb{R}^{m\times m} \times \mathbb{R}^m$. The stochastic differential equation that an MGOU process satisfies is also derived. We further study invariant subspaces and irreducibility of the models generated by MGOU processes and use this to give necessary and sufficient conditions for the existence of strictly stationary solutions of MGOU processes under some extra conditions. The talk is based on [1].

References

[1] A. Behme and A. Lindner (2012) Multivariate generalized Ornstein-Uhlenbeck processes, *Stochastic Process. Appl.* **122**, 1487–1518.

[2] L. de Haan and R.L. Karandikar (1989) Embedding a stochastic difference equation into a continuous-time precess, *Stochastic Process. Appl.* **32**, 225–235.