CONVERGENCE IN VARIATION OF THE JOINT LAWS OF MULTIPLE STABLE STOCHASTIC INTEGRALS

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Abstract: In this note, we are interested in the regularity in the sense of total variation of the joint laws of multiple stable stochastic integrals. Namely, we show that the convergence

\[ \mathcal{L}(I_{d_1}(f_1^n), \ldots, I_{d_p}(f_p^n)) \xrightarrow{\text{var}} \mathcal{L}(I_{d_1}(f_1), \ldots, I_{d_p}(f_p)) \quad \text{as} \quad n \to +\infty \]

holds true as long as each kernel \( f_i^n \) converges when \( n \to +\infty \) to \( f_i \) in the Lorentz-type space \( L^{\alpha}(\log_+)^{d_i-1}([0,1]^{d_i}) \) for \( 1 \leq i \leq p \). This result generalizes [4] from the one-dimensional case to the joint law case. It generalizes also [6] from the Wiener–Itô setting to the stable setting and [5] in the study of joint law of multiple stable integrals.

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