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ASYMPTOTIC BEHAVIOR FOR QUADRATIC VARIATIONS OF NON-GAUSSIAN MULTIPARAMETER HERMITE RANDOM FIELDS

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Abstract: Let $(Z^{q,\mathbf{H}}_{\mathbf{t}})_{\mathbf{t}\in[0,1]^d}$ denote a d-parameter Hermite random field of order $q \geq 1$ and self-similarity parameter $\mathbf{H} = (H_1, \ldots, H_d) \in \left(\frac{1}{2}, 1\right)^d$. This process is $\mathbf{H}$-self-similar, has stationary increments and exhibits long-range dependence. Particular examples include fractional Brownian motion ($q = 1$, $d = 1$), fractional Brownian sheet $(q = 1, d \geq 2)$, the Rosenblatt process ($q = 2$, $d = 1$) as well as the Rosenblatt sheet $(q = 2, d \geq 2)$. For any $q \geq 2, d \geq 1$ and $\mathbf{H} \in \left(\frac{1}{2}, 1\right)^d$ we show in this paper that a proper renormalization of the quadratic variation of $Z^{q,\mathbf{H}}$ converges in $L^2(\Omega)$ to a standard d-parameter Rosenblatt random variable with self-similarity index $\mathbf{H}'' = 1 + (2\mathbf{H} - 2)/q$.

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