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ON THE STRONG CONVERGENCE OF MULTIPLE ORDINARY INTEGRALS TO MULTIPLE STRATONOVICH INTEGRALS

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Abstract: Given $\{W^{(m)}(t),\, t \in [0,T]\}_{m\geq 1}$, a sequence of approximations to a standard Brownian motion W in $[0,T]$ such that $W^{(m)}(t)$ converges almost surely to $W(t)$, we show that, under regular conditions on the approximations, the multiple ordinary integrals with respect to $dW^{(m)}$ converge to the multiple Stratonovich integral. We are integrating functions of the type

$$f(t_1,\dots,t_n) = f_1(t_1)\cdots f_n(t_n) I_{\{t_1\leq\cdots\leq t_n\}},$$

where for each $i \in \{1,\dots,n\}$, f_i has continuous derivatives in $[0,T]$. We apply this result to approximations obtained from uniform transport processes.

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