A time-change approach to Kotani's extension of Yor's formula

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In [2], Kotani proved analytically that expectations for additive functionals of Brownian motion $\{B_t, t \geq 0\}$ of the form

$$E_0[f(B_t)g(\int_0^t \varphi(B_s)\, ds)]$$

have the asymptotics $t^{-3/2}$ as $t \to \infty$ for some suitable non-negative functions φ, f and g. This generalizes, in the asymptotic form, Yor's explicit formula [3] for exponential Brownian functionals.

In this talk, we discuss this generalization probabilistically, by using a time-change argument. We may easily see from our argument that this asymptotics $t^{-3/2}$ comes from the transition probability of 3-dimensional Bessel process.

This talk is based on [1].

References

[1] Y. Hariya, A time-change approach to Kotani's extension of Yor's formula, J. Math. Soc. Japan **58**, 129–151 (2006)

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[3] M. Yor, On some exponential functionals of Brownian motion, Adv. Appl. Probab. **24**, 509–531 (1992)