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EXACT ASYMPTOTICS FOR BOUNDARY CROSSINGS OF THE BROWNIAN BRIDGE WITH TREND WITH APPLICATION TO THE KOLMOGOROV TEST

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Abstract. We consider a boundary crossing probability of a Brownian bridge B_0 and a piecewise linear boundary function $u(t) - \gamma h(t)$. The main result of this paper is an asymptotic expansion for $\gamma \to \infty$ of the boundary crossing probability that $B_0(t)$ is larger than the piecewise linear boundary function $u(t) - \gamma h(t)$ for some t. Such probabilities occur for instance in the context of change point problems when the Kolmogorov test is used. Examples are discussed showing that the approximation is rather accurate even for small positive γ values.

Key words and phrases: Brownian bridge with trend, boundary crossing probability, exact asymptotics, extreme values, large deviations, Kolmogorov test.

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