An excursion approach to functionals of the Brownian Bridge

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Distributions of functionals of Brownian bridge arise as limiting distributions in non-parametric statistics. In this paper we will give a derivation of distributions of extrema and areas of the Brownian bridge based on excursion theory for Brownian motion. The idea of rescaling and conditioning on the local time has been used widely in the literature. In this paper it is used to give a unified derivation of a number of known distributions, and a few new ones. Particular cases of calculations include the distribution of the Kolmogorov-Smirnov statistic and the Kuiper statistic.

This is joint work with Jon A. Wellner.