Title: Zero-crossing statistics of discrete stationary Gaussian processes

In many applications one wishes to know not only when a stochastic variable crosses a boundary for the first time, but also how many times it is crossed in a specific time interval. While we know the average number of crossings <m> for discrete stationary Gaussian processes through the well established Rice formula, we do not know the fluctuations <m^2> or the distribution of crossing events. We calculate those quantities analytically from a generalisation of the so-called Independent Interval approximation, a method where we assume that the length of time intervals between successive zero-crossings are uncorrelated. We apply our results to a discrete version of the Ornstein–Uhlenbeck process, the autoregressive process, but the Independent Interval approximation has a much wider applicability. For example continuous non-stationary Gaussian processes.