

Abstract:

We discuss the generalized Rice formula approach to deriving long-run distributions of characteristics defined at random events of a stochastic process or field.

The approach stems from the same principle originally introduced by Rice for the level crossing intensity in a random signal and we review its extensions to more general contexts.

Events are defined on random surfaces through crossing levels of (multivariate) stochastic fields.

We also account for the dynamics of spatial-temporal fields using observed velocities.

Extensions beyond the Gaussian model are shown and models for sampling from the level crossing distributions are presented.

The importance of these generalizations for applications is illustrated through examples.