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STATISTICAL INFERENCE FOR STOCHASTIC PARTIAL DIFFERENTIAL EQUATIONS

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Abstract

Stochastic partial differential equations (SPDE) are used for stochastic modelling , for instance, in the study of neuronal behaviour in neurophysiology, in modelling sea surface temparature and sea surface height in physical oceanography , and in building stochastic models for turbulence. Probabilistic theory underlying the subject of SPDE is discussed in Ito (1984) and more recently in Kallianpur and Xiong (1995) among others. The study of statistical inference for the parameters involved in SPDE is more recent. Asymptotic theory of maximum likelihood estimators for a class of SPDE is discussed in Huebner, Khasminskii and Rozovskii (1993) and Huebner and Rozovskii(1995) following methods in Ibragimov and Khasminskii (1981). Bayes estimation problems for such a class of SPDE are investigated in Prakasa Rao (1998, 2000) following the techniques developed in Borwanker et al.(1971). An analogue of the Bernstein-von Mises theorem for parabolic stochastic partial differential equations is proved in Prakasa Rao (1998). As a consequence, the asymptotic properties of the Bayes estimators of the parameters are investigated using the asymptotic properties of maximum likelihood estimators proved in Huebner and Rozovskii (1995). Nonparametric estimation of a linear multiplier for some classes of SPDE are studied in Prakasa Rao(2000a,b) by the kernel method of density estimation following the techniques in Kutoyants(1994).