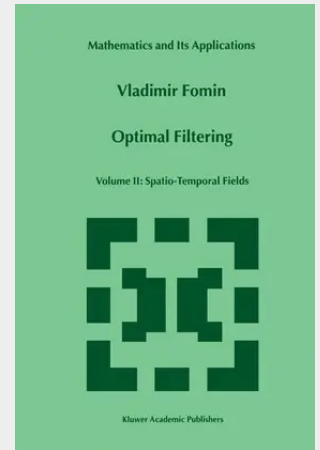


Optimal Filtering

Volume II: Spatio-Temporal Fields

In this volume the investigations of filtering problems, a start on which has been made in [55], are being continued and are devoted to theoretical problems of processing stochastic fields. The derivation of the theory of processing stochastic fields is similar to that of the theory extensively developed for stochastic processes ('stochastic fields with a one-dimensional domain'). Nevertheless there exist essential distinctions between these cases making a construction of the theory for the multi-dimensional case in such a way difficult. Among these are the absence of the notion of the 'past-future' in the case of fields, which plays a fundamental role in constructing stochastic processes theory. So attempts to introduce naturally the notion of the causality (non-anticipativity) when synthesising stable filters designed for processing fields have not met with success. Mathematically, principal distinctions between multi-dimensional and one-dimensional cases imply that the set of roots of a multi-variable polynomial does not necessarily consist of a finite number of isolated points. From the main theorem of algebra it follows that in the one-dimensional case every polynomial of degree n has just n roots (considering their multiplicity) in the complex plane. As a consequence, in particular, an arbitrary rational function $\phi(\cdot)$.

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