Balakin, G. V.

Introduction to the theory of random systems of equations. (Russian) Zbl 0924.60001
Tr. Diskretn. Mat. 1, 1-18 (1997).

The author introduces the notions of random equation systems (RES), surely compatible RES (SCRES), RES with errors in right hand sides and other close notions. All variables take values in a finite set. At any moment $t = 1, 2, \ldots$ a new equation describing one and the same model is included to the system according to some random algorithm. Let ξ_t be the number of solutions at time t. For RES the main problems are to find or to estimate $P(\xi_t > 0)$, and $t_0 := \inf(t : E\xi_{t-1} > 1, E\xi_t \leq 1)$, and $t^* := \inf(t : \xi_{t-1} \geq 1, \xi_t = 0)$. For SCRES the main problems are to find a distribution of the number of solutions and their structure, and $E\xi_t$, and $t_0 := \inf(t : E\xi_{t-1} > 2, E\xi_t \leq 2)$, and $t^* := \inf(t : \xi_{t-1} \geq 2, \xi_t = 1)$. Certain connections are established between different characteristics, mostly under in some sense uniform distributions on appropriate probability spaces. For systems with errors the maximum likelihood method and its reliability are discussed.

In the second paper, see the following entry, Zbl 0924.60002, the distributions for linear RES and linear SCRES are compared. In particular, connections between ranks of matrices are established for two models which allow to give a lower estimate for the value $P(\xi_t > 0)$ for some classes of systems and to show certain asymptotics for other characteristics. For nonlinear systems some asymptotics are found using combinatorial methods.

For the entire collection see [Zbl 0895.00020].

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