

403. S. M. Ulam and John von Neumann: *On combination of stochastic and deterministic processes*. Preliminary report.

A computational procedure for the study of various differential equations—ordinary or partial—is investigated. It consists of a statistical model of the corresponding physical problem and involves a process which is a combination of deterministic and stochastic processes (see Bull. Amer. Math. Soc. Abstract 51-9-165). This procedure is analogous to the playing of a series of “solitaire” card games and is performed on a computing machine. It requires, among others, the use of “random” numbers with a given distribution. Various distributions of such numbers can, however, be obtained by deterministic processes. For example, starting with almost every  $x_1$  (in the sense of Lebesgue measure) and *iterating* the function  $f(x) = 4x \cdot (1 - x)$  one obtains a sequence of numbers on  $(0, 1)$  with a computable algebraic distribution. By playing suitable *games* with numbers “drawn” in this fashion, one can obtain various other distributions, either given explicitly or satisfying given differential or integral equations. (Received September 3, 1947.)