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Determinacy → (observation equivalence = trace equivalence). (English) Zbl 0571.68018

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If an experiment s is conducted on a parallel process p, then, in general, different processes may result from the experiment, due to the nondeterministic behaviour of p (in the notation of Milner [*R. Milner*, A calculus of communicating systems (1980; Zbl 0452.68027)]:p$\Rightarrow^s p'$ for different p'). Process p is called determinate if the resulting processes are all equivalent (i.e., if $p \Rightarrow^s p'$ and $p \Rightarrow^s p''$, then p' and p" are equivalent). This means that, although p behaves nondeterministically, this cannot be detected by an observer of p. Let $\simeq$ denote observation equivalence, used in CCS (*Milner*, loc. cit.) let $\simeq_f$ denote (the much weaker) failure equivalence, used for CSP [*S. D. Brookes*, Lect. Notes Comput. Sci. 154, 83-96 (1983; Zbl 0516.68024)], and let $\simeq_t$ denote (the still weaker) trace equivalence. We show that the three corresponding notions of determinacy are the same, and that for determinate processes $\simeq$, $\simeq_f$, and $\simeq_t$ are the same. Determinacy is preserved under $\simeq$ and $\simeq_f$, but not under $\simeq_t$.

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