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Yufik, Yan M.; Sheridan, Thomas B.

Hybrid knowledge-based decision aid for operators of large scale systems.

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The DSS, whose design if described in the paper, is addressed to operators of large scale systems, that have the paticular problem of planning control actions to achieve multiple and interacting operation goals, when the available informations may be uncertain. In the first part of the paper particular attention is devoted to the problem of designing decision aid in such a way that it can work in cooperation with the user. To this purpose a general model of operator decision making is described along with a taxonomy of operation planning problems. The decision aid is based on a knowledge representation of physical processes, as close as possible to human mental models. The internal knowledge base is represented by means of frames. To obtain the decision aid's recommendation the user has to indicate the operation objectives in terms of desired changes of target system variables. Then the decision aid derives an optimized operation plan, solving a nonlinear optimization problem based on a probabilistic model, describing cause-effect relationships between the various control and measurement devices of the process. Optimization plans are graphically displayed along with the probabilities of predicted operation results. The paper contains no indication of the state of the project, apparently mainly aimed to nuclear reactor core cooling systems, and of practical application.

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Keywords: knowledge-based decision aid; optimization based inference; operator decision making; operation planning problems