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5. Expert Systems in Civil Engineering IABSE Colloquium, Bergamo, Italy, October 18 – 20, 1989

Due to recent developments in artificial intelligence, expert-system technology provides additional help for decision makers. Expert systems are being developed in industry, research institutions and universities. Improvements in knowledge acquisition and representation have provided new and powerful development tools. Also, civil engineers are developing new approaches to problem solving using knowledge bases in order to satisfy more efficiently the needs of their profession.

This Colloquium shall provide the opportunity for specialists involved in the development and application of expert systems in civil engineering to meet and exchange experiences.

Invited speakers shall present applications, new technologies and new solution strategies, thereby providing a forum for discussion. The Colloquium Report shall include the presentations and serve as a basis for the discussions.

Session 1:
Expert-system technology

Civil engineering problems generally cannot be treated by simple expert-system shells (e.g. rule based systems). Solutions require the use of sources and methods such as data bases, numerical computations (e.g. finite-element analysis), treatment of uncertainty and incompleteness, reasoning based on qualitative physics, man-machine interfaces, etc. This session will address the software technology required to manage successfully the complexity of civil engineering problems.

Session 2:
Expert systems for operation, maintenance and damage assessment of structure

Existing and deteriorating structures are complex systems; their behaviour and damage states are difficult to evaluate. In spite of recent advances in structural analysis and computer technology, it is often difficult and economically unacceptable to model mathematically the behaviour of structural systems. Therefore specialist knowledge is required for tasks such as assessing the state of deterioration, determining causes, evaluating associated risks and suggesting a remedial strategy.

Expert systems have found applications in areas such as corrosion, fatigue, bridge rating, vibration, seismic vulnerability and damage assessment.

These areas usually require diagnostic approaches within very specialised areas. Such approaches have enjoyed wide success in other engineering fields.

Session 3:
Expert systems for design and construction

This session will cover the application of expert systems to site layout, preliminary design, code checking, computer-aided design, construction engineering and management, cost estimating, etc. Innovative solution strategies such as «plan-generate-test» and «problem reduction» have been developed.

Session 4:
Expert systems in other areas of civil engineering

Developments in other areas are concerned with geotechnical site characterization, interpretation of in-situ and laboratory soil tests, assessment of hazardous-waste sites, water-quality protection, estimating design floods, etc.

The Colloquium is prepared by an International Scientific Committee – under the chairmanship of Mr. A. G. Frandsen, Denmark –. It is intended for participation of max. 80 specialists.

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