## Performance-based Design in SPanCAD

Applying advanced analysis and simulation software in design of structural dimensions is called performance-based design. In other words, in performance-based design we use software to determine dimensions of beams and columns instead of a code of practice.

Performance-based design involves successive design cycles in which performance is simulated and the design is improved. The challenge is to obtain a good or almost optimal design in the least number of cycles.

Realistic simulation of performance is often less suitable in a design process because it just shows the failure and gives few clues as to how a design can be improved. Therefore, virtual materials can be used in the analysis to speed up the design process. Well-known virtual materials are linear-elasticity and rigid-plasticity. Another virtual material is strengthening material, which becomes stronger when a real material would just break. Clearly, these materials do not exist in the real world but nevertheless they can be applied successfully in structural design.

In this project several virtual materials will be implemented in a computer program for design of reinforced concrete walls. The materials will be used to design reinforcement in several wall-type structures. The design processes and design results will be evaluated and compared with traditional design procedures.

We are looking for a student who can do both in-depth research and structural design. He or she will become familiar with advanced models of reinforced concrete, will learn to program in C++ and will develop new design procedures for reinforced concrete walls.

The project consists of the following stages

- 1. Study the Modified Compression Field Theory.
- 2. Implement five virtual material models in SPanCAD.
- 3. Validate the implemented relations.
- 4. Apply the materials in design.
- 5. Validate the design processes.
- 5. Write a graduation report.



Perhaps needless to say that the results are expected to be interesting for scientific publication.

Available are a computer, software, a WWW connection and enthusiastic support

Datum: Geldig tot: Vakcode: Studiepunter	April 5, 2000 n:26	Afstudeerhoogleraar: Begeleider: Externe begeleider: Afstudeercoördinator:	prof.dr.ir.J. Blaauwendraad dr.ir.P.C.J. Hoogenboom (k. 5.24) ir.J.M.J. Spijkers
		Samenwerkende instantie:	