Analysis

3.4 Geometrical parameters

Geometrical parameters describe the shape, size and overall arrangement of structures, elements and cross sections. When the deviation of any of the geometrical parameters from their sprescibed values may have a significant effect on the structural behaviour and the resistance of the structure, these parameters should be considered as basic variables. The parameters describing their variability should be determined by taking into account prescribed tolerance limits (see 5.4).

In most cases, however, the random variability of the geometrical parameters may be considered to be small in comparison with the variability of the actions and of material properties, or dealt with as included in these variabilities. Hence, in general, the geometrical parameters may be assumed to be non-random and as specified in the design.

4. ANALYSIS

Calculation models and basic assumptions for the calculation should express the structural response according to the limit state under consideration.

For the ultimate limit states, linear, non-linear and plastic theories may be applied depending on the response of the material and the structure to the actions.

For the serviceability limit states linear methods of analysis will usually be appropriate because the material normally remains within the linear elastic range.

For the purpose of analysis, a structure can generally be idealized by reducing it to one dimensional elements (beams and columns), two dimensional elements (slabs and shells) and three dimensional elements.

The influence of the working and environmental conditions on the behaviour of materials, elements and structures should be taken into account by the specific codes for each special material and each special type of structure. If this influence is of a systematic nature it should be expressed directly in the analysis. Sometimes it is possible to express this influence by some working condition factor (see 5.3.2).

The working conditions may, for example, include the effects on strength of temperature (also in case of fire), environmental humidity, duration of a given action, etc and also the influence of any technological peculiarities of construction.

The uncertainties of a calculation model can be included in the model itself e.g. by use of additional parameters (see 3.1 and 5.1). The nature and magnitude of these uncertainties should be estimated by a comparison between calculated results and results observed during relevant tests. These uncertainties can be treated in a similar way to the uncertainties associated with the other basic variables.

5. THE METHOD OF PARTIAL COEFFICIENTS

5.1 Principles

The recommended method of partial coefficients requires the introduction of design values for each basic variable.

In this method:

- actions are expressed by design values F_d according to 5.2.
- strength of materials are expressed by design values f_d according to 5.3. Other relevant properties are treated in a similar way.
- geometrical parameters are expressed by design values a_d according to 5.4.

If the general conditions for the actual limit state not being exceeded is written as

$$\theta\ (F,\ f,\ a,\ \mu,\ C) \geq 0 \qquad (1)$$

the design criterion will be

$$\theta\ (F_d,\ f_d,\ a_d,\ \mu_d,\ C) \geq 0 \qquad (2)$$