LOCAL AND GLOBAL RESPONSE OF REACTOR BUILDINGS AT THE LOADCASE AIRCRAFT IMPACT

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SUMMARY

An aircraft impact on a reactor building will strongly accelerate the struck sector of the structure. But the acceleration will not necessarily much affect the installation and components which are located in other portions of the structure. The impact, which wave-like spreads out, will fade out in the surrounding structure.

The portion of the energy which leads to elastic vibrations of these other branches of the structure depends on how much energy has been dissipated by plastic deformations of the crashed area. Therefore it depends on the local behavior of the material and on the time and load function of the excitation.

The computation of the time history response of the structure derived by using a linear elastic model and the original excitation functions do not show the real behavior of the structure and therefore generally lead to unhandy overestimated accelerations.

In order to get more realistic results and in the case the load functions are defined for a crash against a rigid wall, it is necessary to modify the load functions with respect to the local plastic deformations and the global dynamic stiffness of the rest structure.

Using interactive two and three-dimensional models for the axisymmetric buildings and the boxlike buildings respectively, the influence of the local plastic deformations on the global shear force in the zone of plastic elastic transition and the linear elastic response of the rest structure will be investigated.

By variation of parameters which mainly influence the local and global response of the structure, as e.g. damping-and soil parameters, a possible uncertainty of the results will be considered.

The local behavior of the crashed and plastically deformed area of the structure will be investigated by means of a model which allows to consider the anisotropic properties of the concrete structure.

For some characteristic locations of a typical reactor building, its dynamic response will be demonstrated at hand of time history and response spectra of displacements and accelerations.

The results will be compared with results of a former computation using a former computation using a linear elastic model only.