

ΠΕΡΙΛΗΨΗ ΣΤΗΝ ΑΓΓΛΙΚΗ ΓΛΩΣΣΑ

ABSTRACT

It is generally accepted that foundation soil conditions can potentially modify the dynamic characteristics and the subsequent seismic response of structures. Extensive research performed in this field has revealed that, depending on the earthquake characteristics, and the relative structure-foundation-soil flexibility, ignoring the presence of the supporting soil may lead to unconservative design under certain circumstances. Nevertheless, Soil-Structure-Interaction (SSI) effects are often treated as a beneficial phenomenon on the basis of the perception that the anticipated period elongation of the structure, as well as on the expected energy dissipation at the foundation level caused by wave radiation and hysteretic damping will eventually lead to a reduction of the imposed seismic load. Even in cases where the above assumption is subjective, the inherent multidisciplinary and multiparametric nature of the particular phenomenon prevents the designer from considering SSI effects neglected even in the case of important structures built on non-ordinary soil conditions.

Along these lines, a Knowledge-Based Expert System (KBES) is developed, aiming to assist both on the qualitative and the quantitative assessment of the significance of soil-structure interaction effects during the seismic design process. The knowledge required is derived by state-of-the-art scientific publications, seismic code provisions (i.e. Eurocode 8 and FEMA440), related background commentary as well as expert engineering judgment. (The System is modular and depending on the user's response to a first set of qualitative questions it gradually requests more detailed numerical data, in order to guide user/engineer to solutions of different level of complexity through multiple quantitative criteria, the estimated importance of SSI effects as well as the analysis type desired to be performed). When required, the Expert System proceeds to the calculation of the appropriate static and dynamic stiffness matrices and the corresponding building-dependent spring and dashpot coefficients to be directly used in design. It is considered that the System developed is not only useful for the practicing engineer but also an advanced research tool for the identification of the relative importance of various physical parameters on the potential modification of the structural seismic response due to soil-structure interaction.