TEST OF THE MODEL OF JOINT BETWEEN FLOORSLAB AND SHEAR WALLS OF A PRECAST MULTISTORY BUILDING MADE OR PRESTRESSED CONCRETE

by

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A full scale model of a floorslab spanned between two stiff shear walls by means of prestressed steel wires was tested in the Institute for Testing Materials of the S.R. Serbia in Belgrade with collaboration of the University of California Berkeley.

During the test, the shear walls were rotated by a hydraulic jack, and the angles of rotation and bending moments in the joints were measured and recorded. The alternating loading on the model increased in moderated steps untill the very large rotation of 23.10^{-3} was achieved. A large number of bending moment diagrams, as a function of the shear walls rotation were taken. The "Bending moment - Rotation" ($M - \phi$) diagrams obtained had a typical bilinear form with an expressive "S" skeleton curve. The change of stiffness corresponded to the opening of cracks between the floorslab and the shear walls and always appeared with the same rotation value. With opening of the cracks, the slope of the $M - \phi$ diagram decreased to 45% of its initial value. The decreasing branch of the $M - \phi$ diagram was always parallel to the increasing branch and the distance between these always reflected a constant value of M. Also, the "turning" points of the increasing and the decreasing branches corresponded to the same rotation of the joint namely $\phi = 2.10^{-3}$.

Areas under the hysteresis loops were constant and equal to 13% of the areas under the increasing part of the $M - \phi$ diagrams, i.e. dissipation of energy was constant to the very large rotations ($\phi = 20.10^{-3}$), and corresponded to approx. 2% from critical viscous damping.

Considering the experimental $M - \phi$ diagram the behaviour of the model was analyzed using the El Centro (E-W) ground acceleration record. Similarly the behaviour of two linear elastic models (using the experimental initial-phase stiffness values) with 2% and 0% of critical damping were analyzed. Spectral curves indicated the significantly improved behaviour of the system considering the actual observed $M - \phi$ relationship.The results pointed out the fact that amplification depends both on the form and the area of the hysteresis loop and, also, that the actual hysteretic behaviour can not be substituted correctly by a damped linear elastic system.

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