NON LINEAR DAMPING IDENTIFICATION ON PRECAST PRC BEAMS

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ABSTRACT:

The experimental dynamic analyses of the damping properties of three prestressed reinforced concrete beams demonstrated that purely viscous damping is not a correct approximation of the dissipation phenomena. For ordinary reinforced concrete, interpretative models of the damping mechanism exist (Dieterle R. & Bachmann H., 1981). The damping coefficient of a cracked beam results from the simple sum, in terms of energy, of viscous damping and friction damping.

However, this is not the case in prestressed reinforced concrete. When the load is removed, the crack closes again and the section is compressed: it can be assumed that different phenomena act from that pointed out for ordinary reinforced concrete. The reinforced concrete model cannot therefore be applied to prestressed reinforced concrete elements, especially where there are stresses under decompression level, because the model is based on the fundamental hypothesis that, in the cracked section, the tension is only transmitted by the steel.

This paper discusses a non-linear dissipative mechanism that acts on cracking and its effect on dynamic response. Non-linear damping proved to be extremely effective in damage identification, also at intermediate damage levels. Moreover , this parameter can be useful in practice, because it is be able to detect cracking without prior knowledge of the modal parameters in either the undamaged or damaged state.

REFERENCES

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