Thesis Title: FORCED VIBRATION TESTING OF EXISTING REINFORCED CONCRETE BUILDINGS
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Abstract:
Two forced vibration tests were conducted within the scope of this study. The excitation is provided via a vibration generator. The first test was performed on the Structural Mechanics New Laboratory Building of Civil Engineering Department of METU, a two-story prefabricated reinforced concrete building. The second test was performed on the 4th block of MESA Yonca Evler Housing Complex, a nine-story reinforced concrete building cast in by tunnel forms. Sweeping the frequency of the vibration generator through a range including the natural frequencies of the structure and then recording the steady-state response of the structure at each operated frequency, frequency-response curves are plotted. Frequency-response curves in the form of acceleration amplitude, normalized acceleration amplitude and displacement amplitude versus excitation frequency were determined. Natural frequencies and mode shapes for the first modes of these structures were determined. The fundamental natural frequencies were found out to be 5.993 Hz for the prefabricated building and 3.162 Hz for the building cast in by tunnel forms. These experimental results were then compared with the free vibration analysis results. Moreover, modal damping ratios, which cannot be computed directly from the structural properties or as a result of structural analysis, were also determined. To connect uniaxial accelerometers to the recently purchased 12-channel data acquisition system, a junction box has been designed and produced. Cables connecting the accelerometers to the data acquisition system have also been designed and manufactured within the scope of this study.