Metro Train-Induced Vibration Measurement on Buildings

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Abstract Vibrations in four buildings located at different positions along the Delhi Metro Rail Corporation (DMRC) network have been measured and reported. Vibrations developed due to the passage of metro trains through tunnels located at a depth up to 30 m from the ground level were measured on the considered buildings at different floor levels. To interpret the effect of vibrations on buildings, different vibration parameters, viz. Peak Ground Acceleration (PGA), Peak Ground Velocity (PGV) and frequency content are obtained from the recorded vibrations. These parameters change with the location, depending on the dynamic characteristics of the soil profile at the site of measurement and the building. It is observed that the maximum amplitude of vibrations measured during this study is more than the threshold provided by standards of different countries and can cause vibration of rigid building components, annoying physical sensations in the human body, interference with activities such as sleep and conversation, rattling of window panes and loose objects and fear of damage to the building and its contents.

Keywords Vibrations · Buildings · Field measurements

1 Introduction

In modern cities, transportation systems are coming closer and being integrated like never before, with the residential, commercial and office buildings. As a result, the buildings and their occupants are subjected to a wide spectrum of vibrations produced from various sources including industrial, construction and transportation activities.

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