

Changes in Vibration Periods of the TAIPEI 101 Skyscraper during Typhoon Soudelor in 2015

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The TAIPEI 101 skyscraper (508-m) is comprised of 101 floors and five floors above and below ground, respectively. It is located in the Hsinyi District of Taipei, Taiwan. The skyscraper is equipped with a 660-metric-ton tuned mass damper – the largest of its type in the world. The fundamental-mode frequency of the skyscraper is about 0.15 Hz. Both the skyscraper and the tuned mass damper swayed during Typhoon Soudelor on 8 August 2015. The maximum vertical, E-W, and N-S displacements measured on the 90th floor are approximately 1.5, 32.2, and 44.5 cm, respectively. The Morlet wavelet technique is applied to analyze the dominant periods of three-component seismograms recorded at the 90th floor. The fundamental period of the skyscraper increases by up to 7% during the strong shaking caused by heavy winds. This change in the fundamental period may mainly correspond to a decrease in the system stiffness during the typhoon because the total mass did not change significantly.