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WIND-INDUCED VIBRATION IN TALL BUILDINGS

INTRODUCTION

The development of lightweight material and advanced construction methods combined with urbanization and the need to accommodate more citizens in a smaller area in recent years have resulted in the emergence of taller buildings. Due to their inherently low mass, damping and slenderness decreasing their stiffness, these buildings are susceptible to wind-induced vibrations which can effect occupants negatively. Already barely perceivable acceleration levels can cause nausea and discomfort while high acceleration levels can cause alarm and fear amongst the occupants.

PURPOSE

The purpose of the thesis is to evaluate acceptable acceleration levels in tall buildings. Current building codes will be examined to gain insight in the process of estimating acceleration levels. Accelerations of a tall building subjected to wind-load will be evaluated using Ritz-vectors. Different methods to introduce damping in tall structures will be examined and possibly evaluated as well. The thesis will focus on wind-load dynamics in the early stages of the design process, to give an indication of the dynamic properties of a tall building.

The 828-metre (2,717 ft) tall Burj Khalifa in Dubai has been the tallest building in the world since 2008. Source: Wikipedia

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