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RESEARCH DIRECTIONS

Wind-excited tall buildings

Professor Kenny Kwok from the School of Engineering will lead a team of researchers to investigate the effects of wind-induced vibration on occupants of tall buildings. This project is supported by an Australian Research Council Discovery grant. The multi-disciplinary team includes Professor Vaughan Macefield, School of Medicine, UWS, Dr Peter Hitchcock from the Hong Kong University of Science & Technology, and Dr Darren Walton of Opus International Consultants, Wellington N.Z. The project will also include the research training of a postgraduate student.

'There has been a surge in the construction of tall buildings with heights of up to 1000 metres', says Professor Kwok. 'This worldwide trend is expected to continue as cities cope with demands for offices and residences associated with population growth and lifestyle changes, but such buildings are increasingly wind-sensitive and susceptible to wind "excitations" that heighten the perception of motion of people who are in the buildings. Prolonged exposure to these vibrations can actually cause discomfort, fatigue, affect task concentration and even trigger symptoms of motion sickness for some occupants.'

The researchers will use a combination of methods to find out how people are affected by the experience of being in a very tall building, including a motion simulator experiment. The team will take detailed physiological measurements to assess people's physical reactions to vibration at frequencies and magnitudes comparable to those induced by wind excitation of tall structures. The team will also survey the general population and people who occupy such tall buildings in cities including Wellington, Sydney and Hong Kong. This combination of data will capture the strengths of each different experimental approach and will enable the team to cross-calibrate and validate their findings. As a result of this research, it aims to establish practical, internationally applicable standards for the design of building-vibration that is acceptable for the comfort of the occupants.

The outcomes of the research will advance our understanding of the physiological and psychological responses of people to building vibration induced by wind. It will also establish a unified standard that will deliver superior building performance and enhanced living quality for those building habitants under conditions of strong winds as well as helping to minimise costs associated with adopting mitigation measures and costs related to lost productivity if people are adversely affected by the experience of being in a wind-excited tall building.

Project Title: Occupant comfort, cognitive performance and task performance in wind-excited tall buildings
Funding has been set at: $605,621 over 4 years
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