

Purpose of forming Center of Excellence

Research and education will be conducted at the center in various areas concerning airflow problems and city and architecture problems such as wind hazard, ventilation issues, diffusion of air contaminants, etc. The subjects that the center will deal with are evaluation of design wind speed, reliable wind resistant design method, wind response monitoring system for buildings during strong wind, natural hazard prevention system for urban buildings, ventilation design method aimed at highly utilization of natural ventilation, and realization of a sustainable society with low environmental load, sick houses, issues of the air environment around people, outflow of air contaminants to outdoors, air pollution in urban areas, etc.

COE is planned to be formed with the core role taken by the Wind Engineering Research Center of the University, which will become the Department of Wind Engineering as an independent entity. It will be the only such research center in Asia. The center's importance in Asia will become very high, since Asia experiences frequent human and material damage due to typhoons, etc. and has many developing countries where there are serious air pollution problems. The center's activities are planned to focus not only on research and education on wind effects on buildings and the urban environment, but also on human resource exchanges and information provision resulting in promotion of damage mitigation and environmental protection. This will be accomplished by setting up the APEC Wind Hazard Mitigation Center and APEC Wind Engineers Network.

The Wind Engineering Research Center, as the core of COE, has seven wind tunnels and is staffed with five professors, one associate professor and one lecturer. These researchers are in the fields ranging from structural engineering to environment engineering. The center conducts joint researches with world-class researchers and promotes PD and RA. Unlike in the seismic engineering and the fire resistance engineering fields, this research center for wind effects is unique in Japan.

85% of the economic losses due to natural hazards in the world are caused by wind damage. It is especially important to decrease wind damages in Japan and Asia. This is because of the problems of closely-spaced tall buildings in large cities and high-density residential areas where the majority of houses are made of wood. Development of a ventilation design method is also considered to be important as a national level subject. It is aimed to save operating

energy costs and to decrease the load on the global environment. Air pollution that seriously impacts human health is a critical issue, especially in Asia where the population density is high. The solution to these problems and the related technology transfer should be Japan's responsibility.

It is proposed to develop a method for estimating the probability of strong wind occurrence, for establishing a reliable wind resistant design method, for developing wind response monitoring systems and health monitoring systems for urban buildings and for providing hazard prevention systems to urban areas. Furthermore, a high-quality model will be developed to estimate natural ventilation. As a result, energy consumption will be reduced in private-use air-conditioning systems. It is also proposed to develop methods for preventing air pollution in urban areas and indoor spaces. These methods will contribute greatly to maintaining people's health. The results will be incorporated into the recommendations for wind resistant design in Japan and global standards or recommendations such as ISO. They will also be reflected in education on wind hazard mitigation and dissemination of knowledge in APEC countries through the activities of APEC Wind Hazard Mitigation Center.

Work Program in formation of Research Center of Excellence

The scope of work is evaluation of design wind speed, understanding of the characteristics of wind forces acting on buildings, establishment of a method for estimating wind responses, construction of and proposal for wind response monitoring systems and wind hazard prevention systems (area of wind resistant structures), development of a method for designing openings for natural ventilation systems to promote the use of natural ventilation energy (area of ventilation), and establishment of a method for preventing urban and indoor air pollution (area of wind environment and air pollution). In addition, it is aimed to enhance human resources such as PD, etc. and research facilities. The scope of the center's activities includes technology dissemination through APEC Wind Hazard Mitigation Center, APEC Wind Engineers Network, etc. and information delivery to the society by disclosing a digital database for wind pressure and wind force using the Technical Information Room for Wind Engineering.