Some engineering applications of fluid mechanics

CE319F

Elementary Mechanics of Fluids

Fall 2018 (Kinnas)

The University of Texas at Austin

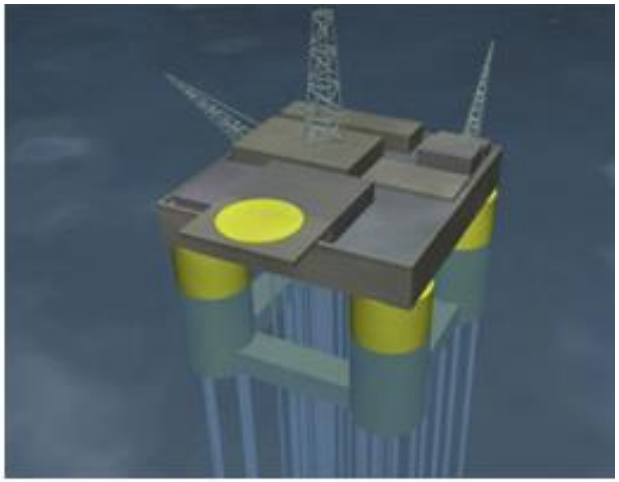
Civil, Architectural, and Environmental Engineering

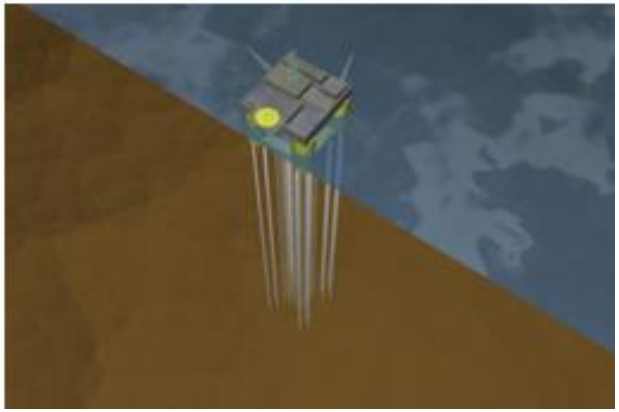
Rivers

Dams

Ships

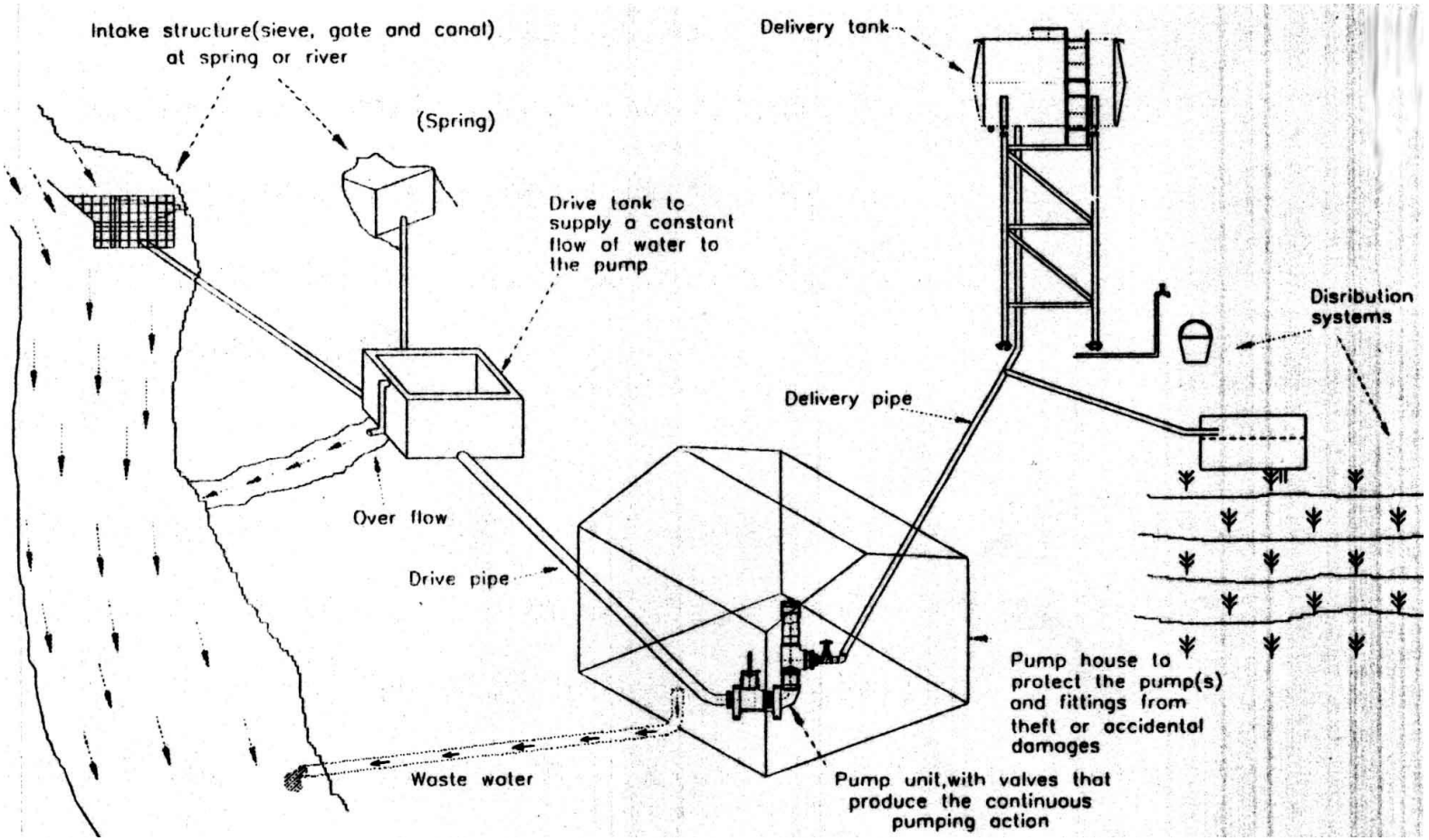
Offshore Structures





Pipelines

Hydraulic systems

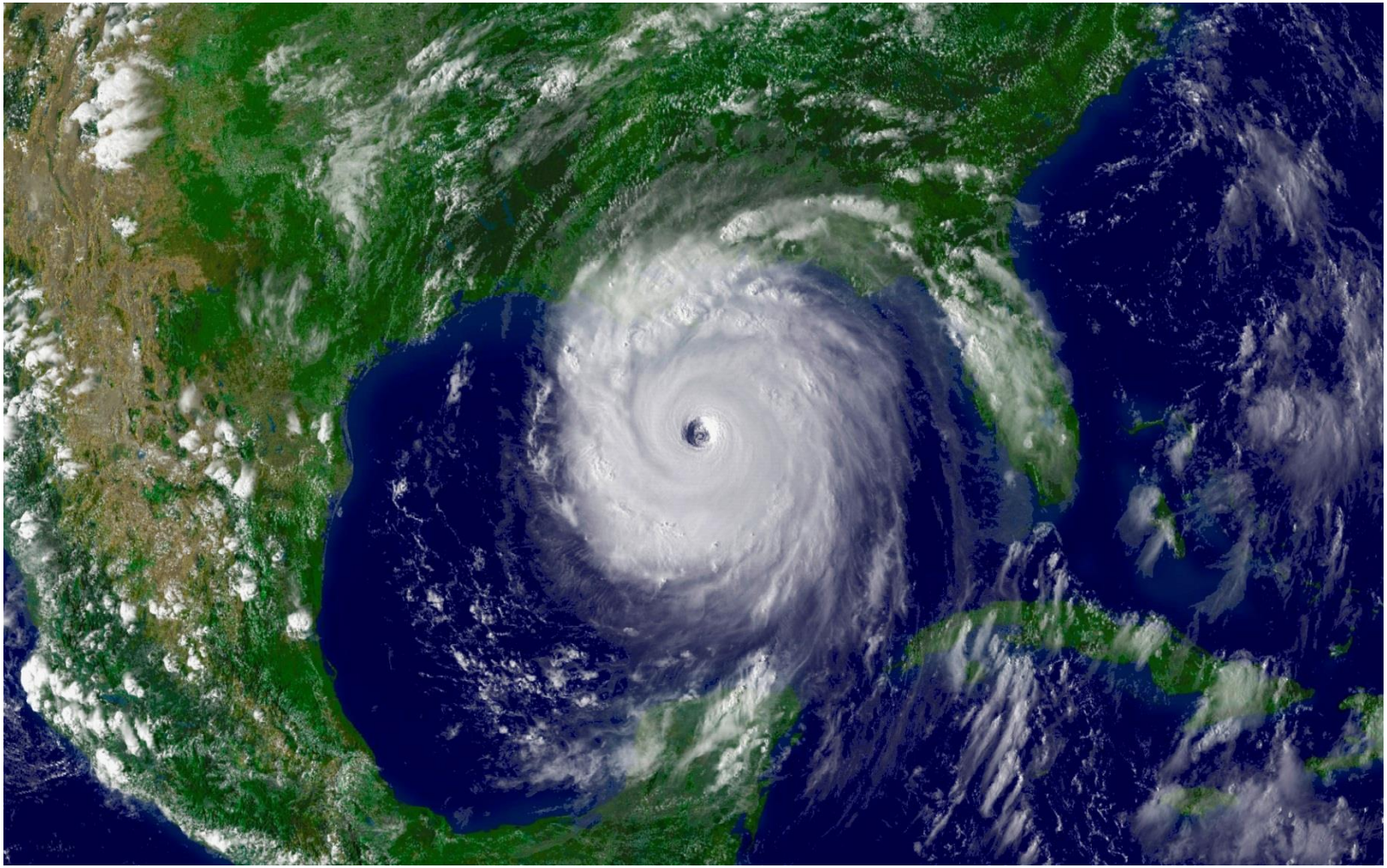


Wind turbines

Ocean Current Turbines
(taken out of the water for maintenance)

Waves

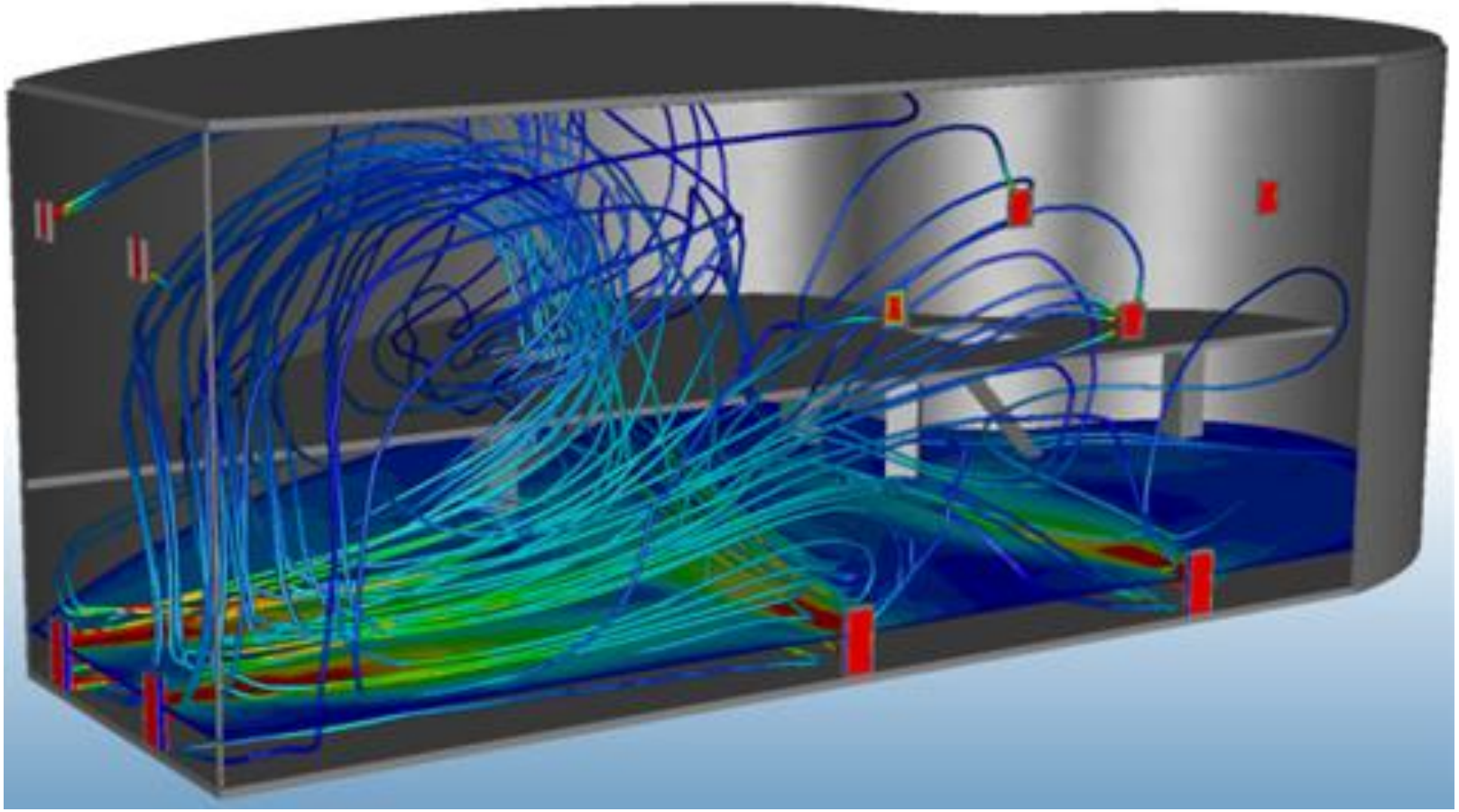
Satellite image of Hurricane Katrina
(Aug. 28, 2005, cat. 5, wind speeds at 175 mph)

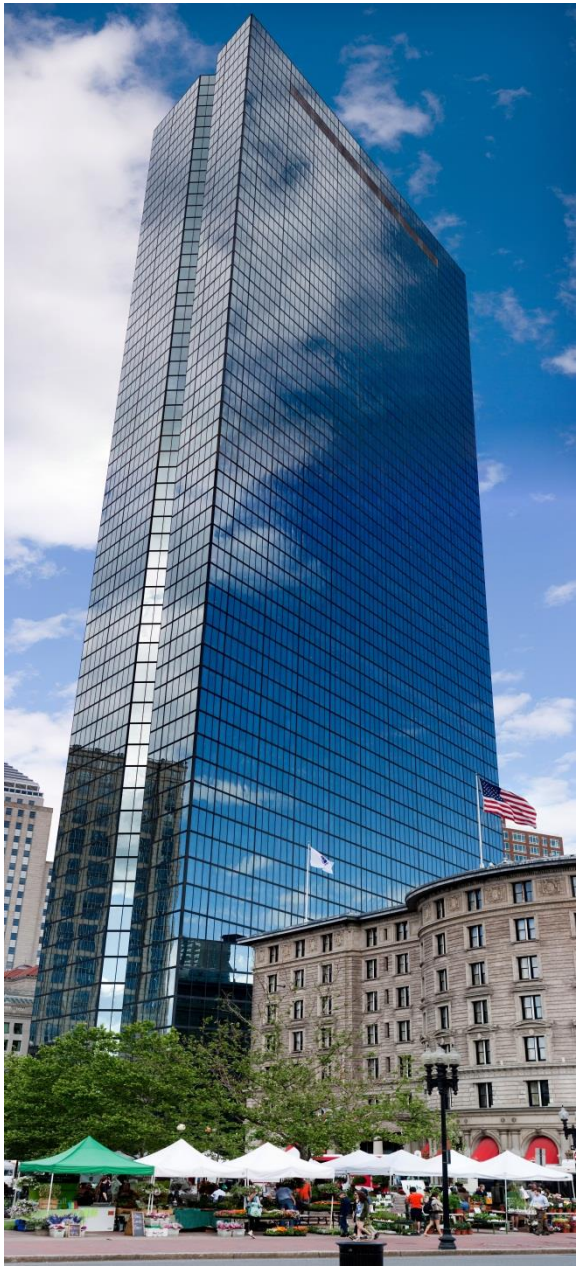


Contaminant flow inside rivers or estuaries

In Vereeniging, 120 million litres of raw sewage is being discharge into the Vaal River system every day (from http://thegreentimes.co.za/urgent-action-needed-to-remedy-south-africas-water-crisis/)

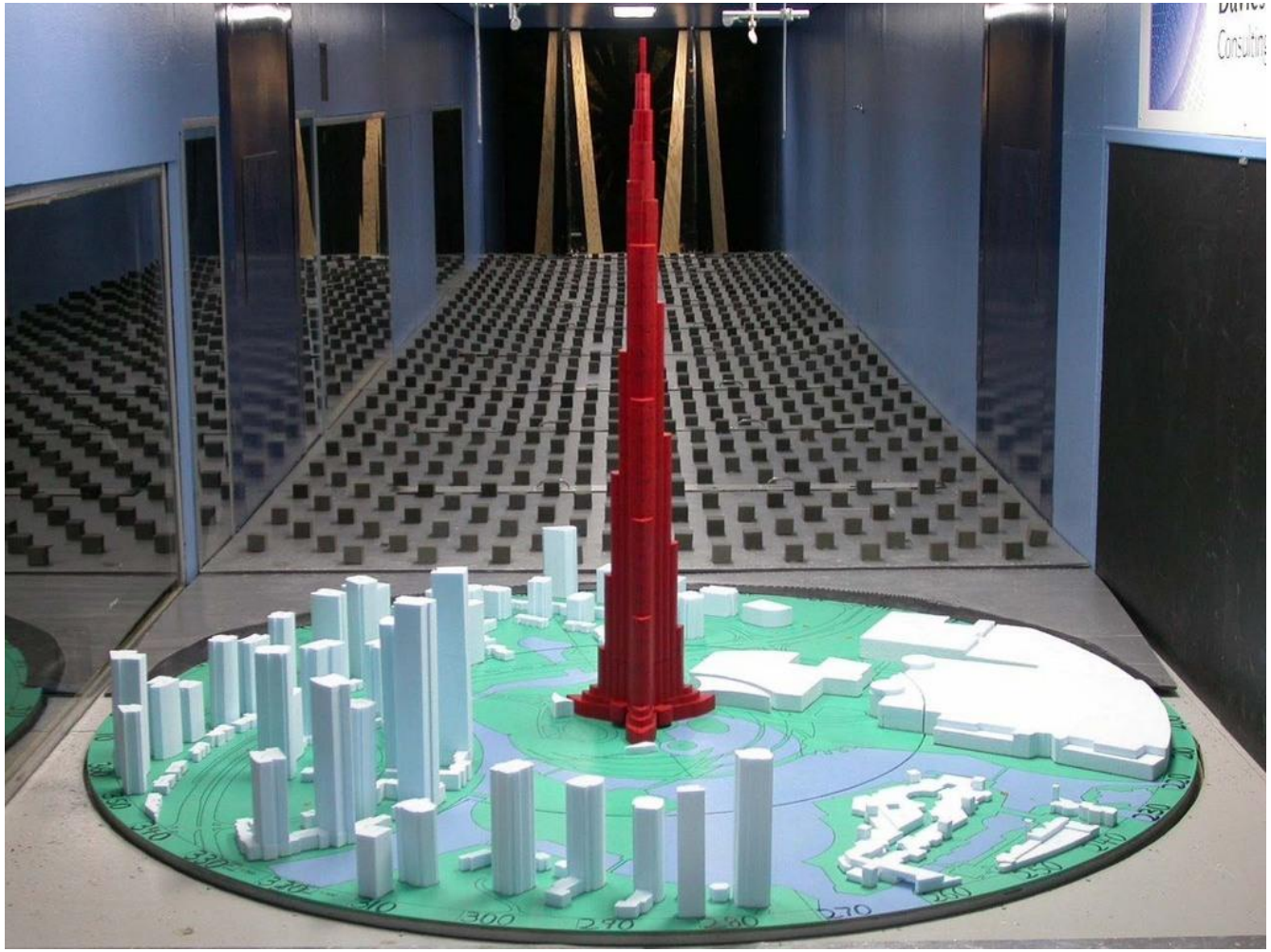
Air flow for ventilation inside houses or buildings





Boston's John Hancock Tower (241 m, 60 floors) was originally vibrating excessively at wind speeds > 45mph and causing windows to fall (…became the "Plywood" palace!)

Testing of models of buildings inside wind-tunnel



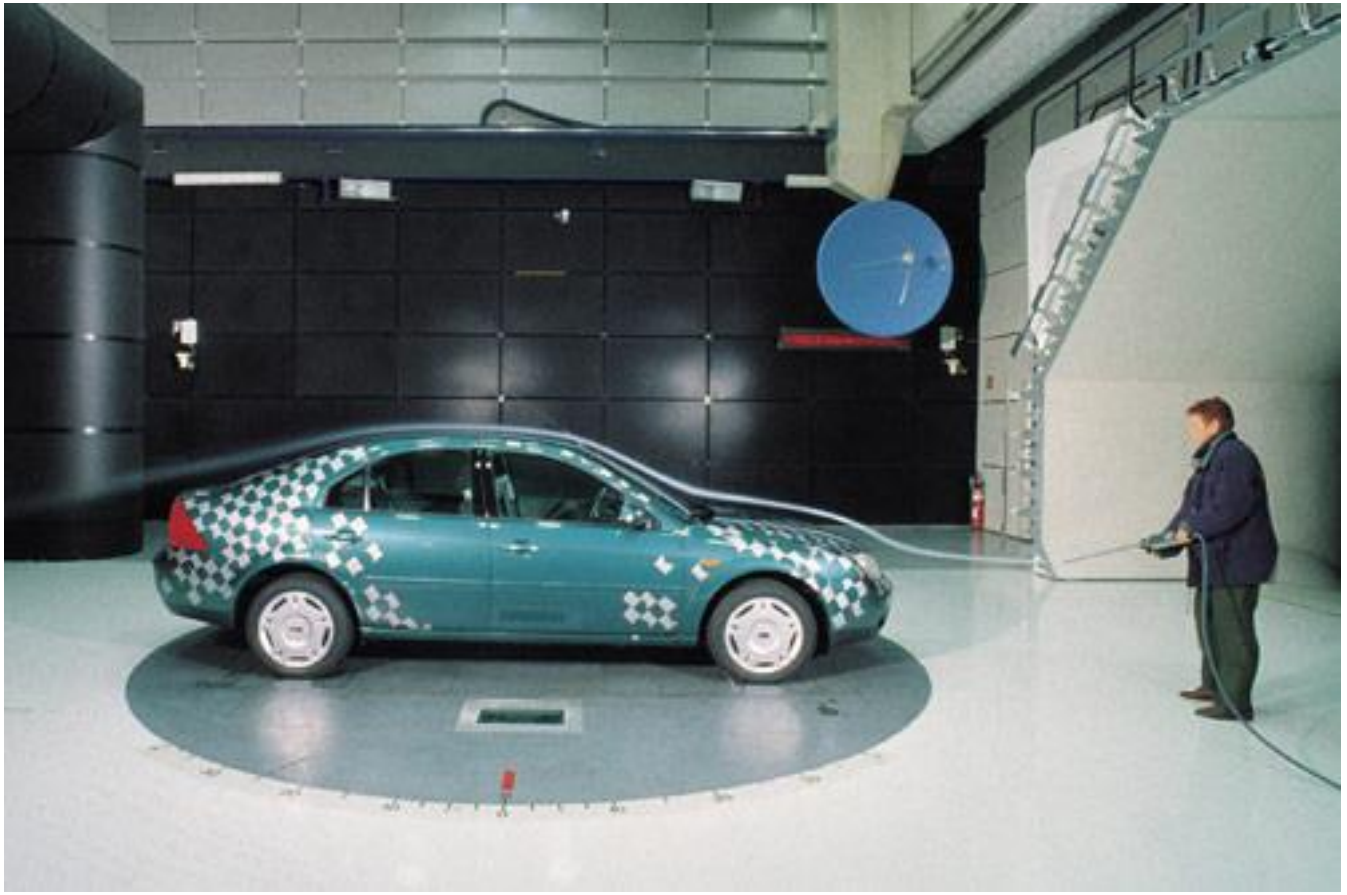
Burj Dubai skyscraper in Dubai, U.A.E. World's tallest building (828 m, 163 floors)

See what can happen to a bridge if you do not account for the wind forces!

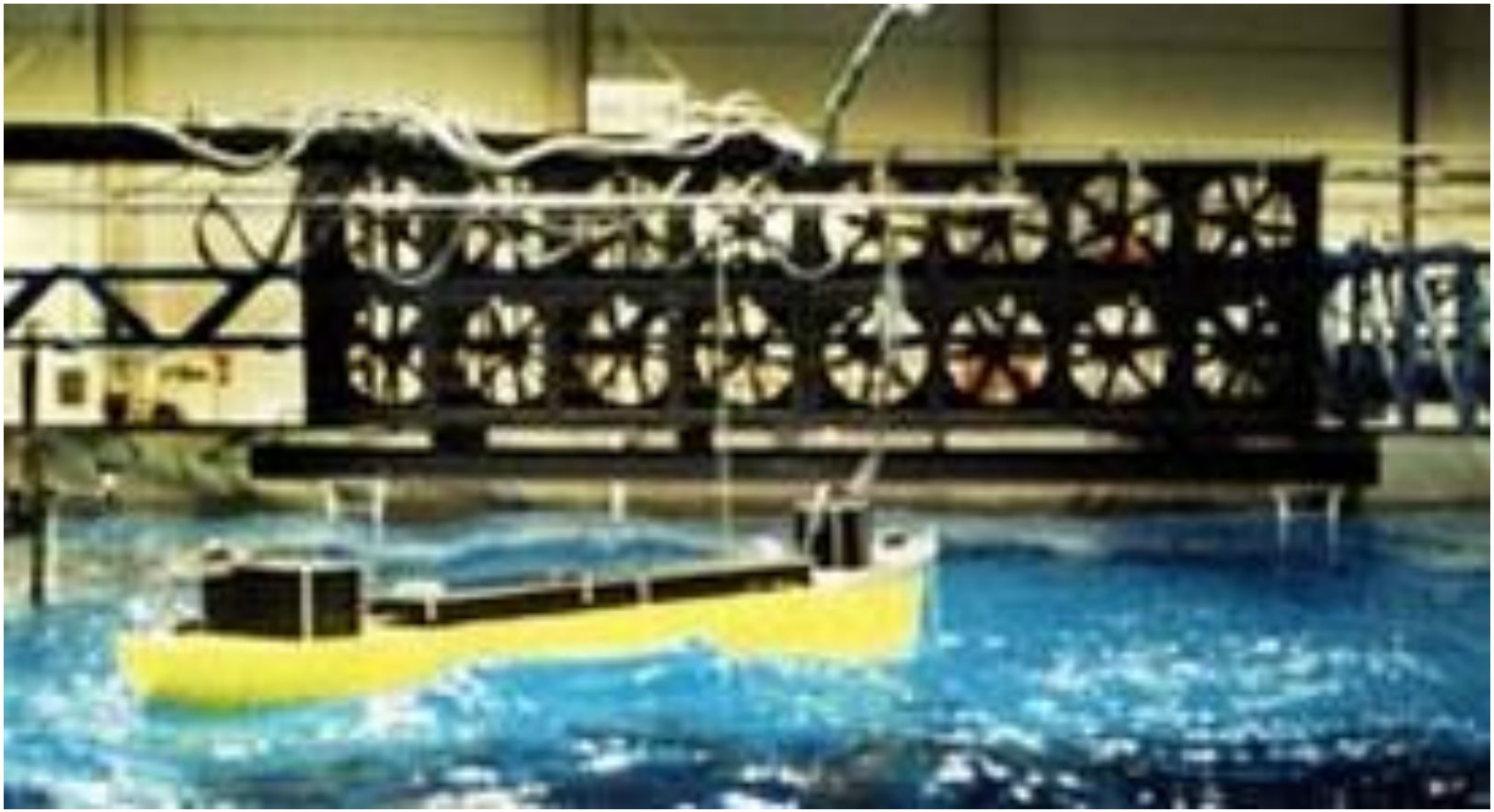
http://www.youtube.com/watch?v=3mclp9QmCGs

Testing of bridges inside wind-tunnel (NEW twin bridges at Tacoma Narrows)

Testing of cars inside windtunnel to reduce air resistance



Testing of models of tankers, offshore structures at the Wave Basin of Offshore Technology Research Center (OTRC) (joint center by UT Austin and TAMU)



Civil, Architectural, and Environmental Engineers need to know how fluids flow, and how they affect or are affected by objects in contact with them (or dispersed inside them), so that they design these objects properly, for un-interrupted and safe function (or to provide better control of the dispersed substances)!