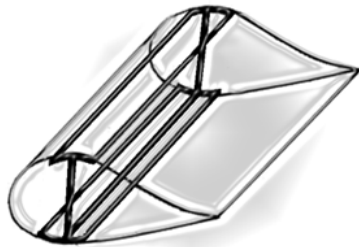
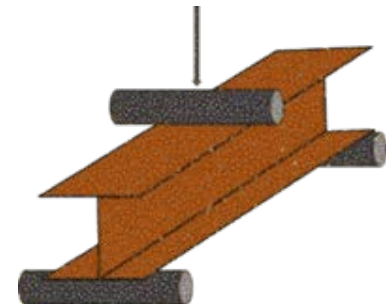
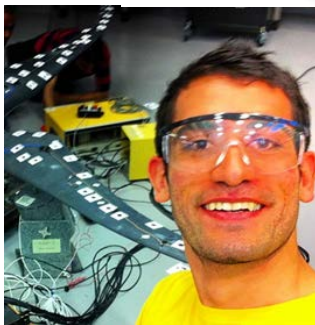
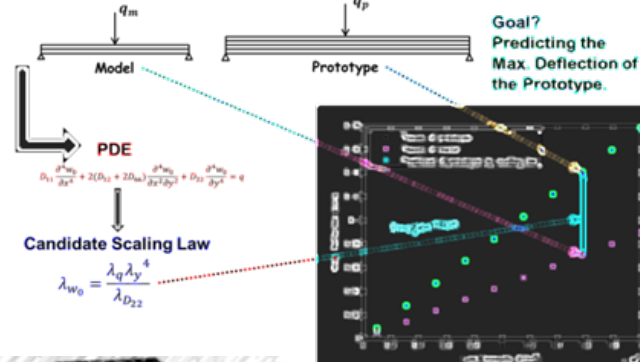


**PHD DISSERTATION – MOHAMAD EYDANI ASL**

**Subcomponent Testing of Wind Turbine Blades  
using Scale Models**



**Similitude theory**



The mechanical behavior of new materials for wind turbine blades is initially characterized by using coupon testing and finally by full-scale blade testing. The coupon testing is not always representative of performance of the new materials, and full-scale blade testing is time consuming and very expensive. To bridge the large gap between coupon testing and a full-scale test, subcomponent testing is proposed as a cost-effective alternative. To design a meaningful scaled-down subcomponent emulating the structural conditions experienced in the full-scale component, it is proposed that similitude theory can be applied to the I-beam structure of a wind turbine blade involving spar caps and the shear web, to design scaled-down models. Applicability of similitude theory in design of scaled-down composite structures is then investigated by manufacturing and testing the designed I-beams.