



Department of Civil Engineering and Engineering Mechanics  
Columbia University

**Tuesday, March 29, 2011 (2:30-3:30 pm)**

**644 Mudd**

## **Carbon Fiber Reinforced Polymer Cables for Suspended Bridges: Why? Why Not? What If?**



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Cables of suspended structures are suffering due to increased corrosion and fatigue loading. Since 1980 EMPA in Switzerland has been developing Carbon Fiber Reinforced Polymer (CFRP) parallel wire bundles as cables for suspended structures. The excellent properties of those bundles include corrosion resistance, very high specific strength and stiffness, superior equivalent moduli and outstanding fatigue behavior. An anchoring scheme produced with gradient materials based upon ceramics and epoxy is described. For the first time large CFRP cables were applied in 1996 on the vehicular cable-stayed Stork Bridge with 124 m span in Winterthur, Switzerland. The performance of these cables and later applications was and still is monitored with fiber optical monitoring systems. Up to date these results are fully matching the high expectations. Under the assumptions that (i) the behavior of the pilot applications of CFRP cables described in this presentation is further on fully satisfactory, (ii) active systems for distributed mitigation of wind-induced vibrations are going to be successful and (iii) there is a need for very extremely long span bridges to cross straits like that of Bab el Mandeb, Messina or Gibraltar: why should the next generation of structural engineers not use CFRP cables for extremely long span bridges? This would open spectacular new opportunities.

### **Biosketch**

Prof. Meier is a Professor at ETH, the Swiss Federal Institute of Technology, and the Managing Director of EMPA, the Swiss Federal Laboratories for Material Science and Technology, in Zurich. He is actively involved in the field of advanced composite materials and adaptive material systems for the past 33 years, with approximately 300 publications, and 5 internationally recognized patents in the application of advanced composite materials in structural engineering. He has an MSc from ETH, did his postgraduate studies in Massachusetts Institute of Technology, and has been awarded the Doctor of Engineering, honoris causa by the Royal Military College of Canada.