(Structural Mechanics - Cables)

Lecture 6 and 7

Assoc. Prof. Savaş ERDEM
Cables - Assumptions

- Perfectly flexible
- Inextensible
- Three different load cases: concentrated; distributed and self-weight
Cables – Background

(Hibbeler, 2011)
Cables Subjected to Concentrated Loads

(Hibbeler, 2011)
Cables Carrying to Self-weight

(Hibbeler, 2011)
Cables Subjected to Uniform Distributed Loads
Suspension Bridge – Stress Analysis

[Diagram of a suspension bridge showing steel cables under tension and load-bearing pillar under compression.]

(https://sciencestruck.com/)
A Case Study – 3. Bosphorus Bridge

(https://www.ysskoprusuveotoyolu.com.tr/)
Cables - Materials

Her tel, teker teker galvanize edilmiş olmalı.
Each wire will be galvanised one by one

Tel ve kılıf arası wax dolu
Wax fill between strand and sheat

7 telli 1 halat (büklüm)
7 wire strand

Yüksek yoğunluklu polietilen kılıf
High density polyethylene sheat (HDPE)

Her kablo (halat grubu) yukarıdaki halatların (büklüm) bir araya gelmesi ile oluşacaktır.
Each cable will be composed of strands.

Cable sheat
3rd Bosphorus Bridge

(S. Erdem, 2015)
The vertical component of earthquake!!!
The vertical component of earthquake!!!

Cypress Viaduct (Nakata et al., 1999)
The vertical component of earthquake!!!
Bridge Collapse Mechanism

The vertical component of earthquake (equilibrium)

The vertical component of earthquake (labile)
Bridge Collapse Mechanism

Different mode effects (equilibrium)

Different mode effects (labile)
Bridge Collapse Mechanism

Thermal effect (equilibrium)

Thermal effect (labile)
Bridge Collapse Mechanism

Soil-structure interaction (equilibrium)

Soil-structure interaction (labile)
References:


2) (https://www.ysskoprusuveotoyolu.com.tr/)