Investigation into the Behavior of Extradosed Bridges under Service Loads

Ahmed Ismail Mohamed Baraka, Dr. Bakhoum M M, Dr Saad F A

Cairo University
Giza, Egypt


Abstract
The thesis summarizes a list of extradosed bridges all over the world. In addition, it highlights a quantitative comparison between different possible designs of a medium span bridge of 180 m. The thesis utilizes full nonlinear analyses for extradosed bridges considering material nonlinearity due to crack and geometrical nonlinearity due P-Δ effect. Cable idealization is also taken into account and form finding is performed for all the models investigated in the study, in order to reach the appropriate cable forces and achieve uniformity of deck straining actions and deformations against permanent loads. An evaluation is performed regarding applying the material and geometrical nonlinearities so that the importance and the necessity of each type are shown. Several comparisons are held through the thesis while studying the variation of different parameters concerning deck axial and bending stiffness and tower axial and bending stiffness. The thesis represents three types of systems of extradosed bridges with respect to the possible cable locations.

An economical comparison is applied between the three mentioned systems through a practical example and cost estimate is carried out to show the economical advantages of extradosed bridges.

Keywords
Extradosed Bridges, Cables,