

学术论文

受弯混凝土箱梁翼缘有效宽度试验研究与分析

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摘要:

在大比例长悬臂梯形截面混凝土箱梁模型受弯性能试验研究的基础上, 结合混凝土箱梁的特点, 通过选用相应的单元类型和材料本构关系, 运用ANSYS大型有限元分析程序模拟了试验全过程, 模拟结果与试验结果吻合较好; 大量参数分析表明: 在弹性受力范围内, 宽跨比是影响翼缘有效宽度计算系数的主要因素; 在承载力极限状态下, 影响翼缘有效宽度计算系数的主要因素有宽跨比、纵向受拉区钢筋配筋率、钢筋屈服强度以及混凝土抗压强度。分别给出了翼缘有效宽度计算系数在弹性工作状态下和承载力极限状态下的计算公式, 为初等梁理论应用于解决混凝土箱梁正截面受弯承载力计算提供了试验和理论依据。

关键词: 混凝土箱梁 受弯性能 剪力滞效应 翼缘有效宽度

Experimental research and analysis of effective flange width on bending concrete box girder

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Abstract:

Based on the experimental research and the characteristics of large scale and long cantilever concrete box girder with trapezoidal section, this paper employed ANSYS program to simulate the whole experimental process of the concrete box girder by selecting element models and material constitutive relations. The analysis results are in good agreement with the experimental results. Then, key factors affecting effective width calculation coefficient are drawn from great deals of parameters analysis. In elastic state, width-span ratio is the principal factor that affects effective width calculation coefficient, and in carrying capacity limit state, width span ratio, steel reinforcement ratio, yield strength of steel bars and compressive strength of concrete are the major factors. The formulas for effective width calculation coefficient have been proposed both in elastic state and carrying capacity limit state, which can be used as a reference for the application of elementary beam theory in settling the ultimate flexural capacity calculation of concrete box girder.

Keywords: RC box girder flexible behavior shear lag effect effective flange width

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