

学术论文

广州亚运城体操馆结构设计

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摘要: 广州亚运城体操馆屋盖结构体系由比赛区直腹杆拱架体系、训练区桁架体系和飘带区单层网壳三个大单元构成,各单元通过内外环梁和H形钢梁连接。将上部钢结构与下部混凝土结构进行整体建模计算,通过节点有限元分析确定了直腹杆拱架节点刚接形式,总结了判断节点刚度的标准。通过精细分析,确定了主要受力构件——柱和直腹杆拱桁架各杆件的计算长度。对支撑体系进行优化设计,确定结构抗侧刚度。通过大悬臂端铺设应力蒙皮板计算分析,表明应力蒙皮板起到了一定的抗震作用。最后对本工程进行了弹塑性时程分析,考察了整个结构大震下的受力特征,分析表明支撑钢屋盖的内环柱及外环柱均处于弹性状态,下部混凝土柱基本处于弹性状态。

关键词: 大跨度钢结构 侧向刚度 塑性铰 蒙皮 节点刚度

Structure design of the Asian Games Gymnastics Stadium in Guangzhou

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Abstract: The Asian Games Gymnastics Stadium structure system is composed by three relatively respective units link each other by circular spatial truss or H-shaped steel.The three units are competition gymnasiums arch truss system without diagonal member,the training gymnasiums truss system and single-layer lattice shell system.The analytical model is consisted of roof steel structure and concrete structure.The steel joints of arch truss without diagonal member is designed as rigid connection by the FEM and the joints rigidity is reported in this paper.Through precise analysis,the effective length of column and the arch truss are determined.The lateral bracing system is optimized to obtain the proper lateral stiffness.The analysis indicates that the stressed steel skin plates have some effects in resisting earthquake load.The overall nonlinear time history analysis reveals that the main supporting columns and the foundations are all in elastic state during an extreme earthquake event.

Keywords: lateral stiffness plastic hinge stressed skin effect joints stiffnes

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