

世博会工程专辑

上海虹桥交通枢纽磁浮站结构一体化设计研究

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摘要:

上海虹桥综合交通枢纽磁浮站采用混合框架结构、磁浮支承结构、地铁支承结构三者合一的结构型式。为了研究三合一结构体系能否达到预期的使用功能,采用动力时程分析,建立了合理的技术路线,研究并确定了三合一结构体系的分析模型与荷载工况,计算了磁浮和地铁列车动力荷载、建筑物荷载作用下三合一结构的反应。结果表明,在最不利的荷载组合工况下,各磁浮轨道梁下的支座绝对位移均在2mm以内,支座间相对弹性位移最大值为0.30mm;地铁轨道下基础底板出现2.5208mm的竖向位移,最大转角为0.000033rad,即轨面不平顺的变化率小于0.1%。根据相关标准和资料,磁浮和地铁列车可以正常运行,建筑结构可以正常使用,将建筑结构、磁浮支承结构、地铁支承结构进行一体化设计是可行的。

关键词: 混合框架结构 三合一结构 动力分析 动力响应

Structural integrative design of maglev station in Hongqiao Communication Junction

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Abstract:

Maglev train station of the Hongqiao Communication Junction adopts design integrating the station structure, maglev support structure, and subway support structure into to one structure. The integrative structure is a unique one without any precedent. In order to study if the integrative structure can achieve anticipative function, dynamical analysis was carried out. Reasonable technical strategy was developed for the analytical models and load cases, and then the responses of integrated structure under load of maglev train, subway train, and building were calculated. The results indicate that the absolute maximum displacement of orbit beam pedestals is less than 2mm, the relative maximum elastic displacement between pedestals is 0.304mm, the maximum vertical displacement of subway orbit is 2.5208mm, the maximum circumrotate angle of subway orbit is 0.000033rad, that is, the variational rate of orbit surface unevenness is less than 0.1% under worst load case. According to relevant criteria and data, the maglev train and subway train can operate normally, and it is feasible to design station structure, maglev train support structure, and subway support structure as an integrative structure.

Keywords: hybrid frame structure integrative structure dynamical analysis dynamical response

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