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肋上开孔对预制预应力混凝土带肋薄板施工阶段挠度计算方法的影响研究

吴方伯[1], 黄海林[1], 陈伟[1,3], 周绪红[1,2]

1. 湖南大学土木工程学院,长沙 410082;2. 兰州大学土木工程与力学学院,兰州 730000;3. 湖南高岭建设集团股份有限公司,长沙 410153

INFLUENCE OF PREFORMED HOLES ON FLEXURAL DEFLECTION CALCULATION METHODS OF PRECAST PRESTRESSED CONCRETE RIBBED PANELS FOR COMPOSITE SLABS

WU Fang-bo[1], HUANG Hai-lin[1], CHEN Wei[1,3], ZHOU Xu-hong[1,2]

1. Civil Engineering School of Hunan University, Changsha 410082, China;2. School of Civil Engineering and Mechanics of Lanzhou University, Lanzhou 730000, China;3. Hunan Gaoling Construction Group Stock Limited Company, Changsha 410153, China

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摘要 预制薄板(预制预应力混凝土带肋薄板)施工阶段的受力性能与肋上孔洞分布及肋端缺口尺寸相关。为便于工业化生产及现场拼装，对预制薄板进行了规格设计。以肋上孔洞分布及肋端缺口尺寸为研究的影响因素，理论给出考虑肋上孔洞分布及肋端缺口尺寸的预制薄板弯曲挠度通用公式，结合工程实际，推导了预应力、均布荷载作用下两端简支预制薄板的等效刚度公式，便于编制计算机程序进行计算。借助MATLAB7.0，对比分析了5 种肋上孔洞分布形式预制薄板的跨中预应力反拱度、自重余拱以及施工阶段的挠度，结果表明：肋上孔洞分布对预制薄板的跨中挠度影响明显，且随板件长度增大逐渐减小。对于采用110mm×25mm 孔洞的预制薄板，建议预应力反拱度取无孔模型与通孔模型计算挠度的平均值，自重余拱、施工阶段的跨中挠度按通孔模型计算。

关键词： 叠合板 带肋薄板 肋上开孔 预制预应力混凝土 弯曲挠度

Abstract： Mechanical behaviors in construction phase of PPCRP (Precast prestressed concrete ribbed panels) relate to distributions of preformed holes in the rib. For the convenience of industrialized production and site operation, the specification design is discussed. The general formulas of flexural deflections are deduced, taking into account the distributions of preformed holes in the rib and equivalent rigidity formulas for PPCRP, which are easy to program with MATLAB. The contrast analysis among the inverted camber and remaining camber under dead weight and deflection in construction stage with 5 different distributions of preformed holes is conducted, and the result shows that preformed hole distributions have an obvious effect on the deflections, which decreases with the increase of length of PPCRP. It is suggested that inverted camber can take the average of the deflection calculated by a solid rib model and a through-holes rib model, and the remaining camber under dead weight and deflection in the construction stage can be calculated by the through-holes rib model.

Key words： composite slabs ribbed panels preformed holes precast prestressed concrete flexural deflection

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地址：北京清华大学新水利馆114室 邮政编码：100084
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