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框架–密肋复合墙结构剪力分担率计算方法研究

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CALCULATION METHOD FOR THE SHEAR-SHARING RATIO OF FRAME-COMPOSITE WALL STRUCTURE

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摘要 密肋复合墙体具有独特的结构构造形式，其刚度可按不同抗震设防要求进行调整，并可满足复杂建筑形式的要求。该文以框架-剪力墙结构为依据，对框架-密肋复合墙结构协同工作机制及剪力分担率计算方法进行较为系统的研究。基于Timoshenko梁基本理论，将框架-密肋复合墙结构视为由剪切型悬臂框架、弯剪型悬臂梁组成的双重抗侧力体系，采用连续化方法建立框架-密肋复合墙结构的位移微分方程，推导出了计入复合墙剪切变形的水平位移解析表达式和内力计算公式。根据前期试验获得的墙体模型低周反复荷载试验数据，拟合得出密肋复合墙体指数式刚度退化模型，量化了墙体在各变形阶段的刚度退化系数。在此基础上提出不同变形阶段框架-密肋复合墙结构剪力分担率的实用计算方法，并通过算例验证了复合墙刚度退化对结构内力分配的影响程度。

关键词： 框架-密肋复合墙结构 位移微分方程 剪切变形 弯曲变形 刚度退化 剪力分担率

Abstract： The multi-grid composite wall has unique structural types, and its stiffness can be adjusted according to different anti-seismic requests and complex architectural styles. In the context of the frame-shear wall structure, the cooperative work mechanism and shear-sharing ratio calculation method of frame-composite wall structures are studied systematically in this paper. Based on the fundamental theory of Timoshenko beam, the frame-composite wall structure is treated as double anti-seismic system consisting of shear type frames and shear-flexural type beams. The fundamental differential equation is established by the continuous approach, and its analytical solution of displacement and internal force are derived. Based on typical multi-ribbed composite walls test data, the stiffness degradation model of composite wall is established, and stiffness degradation coefficient at different stages is quantified. Then the practical computational method of earthquake shear-sharing ratio on the frame-composite wall structure is put forward, and the dependence of internal force distribution on the composite wall rigidity degeneration is discussed through concrete examples.

Key words： frame-composite wall structure displacement differential equation shear deformation bend deformation stiffness degradation shear-sharing ratio

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