Parameter Determination Method Of Infill Wall Calculation Model Considering Stiffness Sensitive Factors

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The infill wall as a non-structural member in the frame structure can provide additional stiffness to the structure, however, the infill wall is only applied to the beam as a line load in structural design, where the reduction of the overall structural period is considered and its effect on the structural stiffness as well as the bearing capacity contribution are ignored. Such design models cannot assess the true responses of the structure accurately. The modeling methods of frame structures considering the influence of infill walls include simplified mesoscopic model and equivalent diagonal bracing model. The former one has high calculation accuracy, which is difficult to calculate and not suitable for complex structures. The latter one is simple to calculate, where the errors are relatively larger because the influence of the infill wall size, the size of the opening and other factors on the stiffness of the infill wall are not fully considered in the model design parameters such as diagonal bracing width. The method for determining the parameters of the diagonal bracing model considering the stiffness-sensitive factors of the infill wall which based on the single-story single-span frame concrete structure is studied in this paper. The geometrical dimensions of the infill wall, the size of the opening and other factors affecting the stiffness of the infill wall are brought in the simplified mesoscopic model to determine the sensitive factors about the structural stiffness, dynamic characteristics and local force situation respectively. The influence mechanism of each sensitive factor on the diagonal bracing model parameters is clarified by comparing the simplified mesoscopic model with the equivalent diagonal brace model. The mapping relationship between the sensitive factors and the diagonal bracing model parameters can also be established, which means that the corresponding diagonal bracing parameters can be determined according to the different working conditions of sensitive factors. Furthermore, the study can provide a theoretical basis for the determination of the parameters of the infill wall stiffness model in the structural simulation analysis.