

Prediction of Fluctuating Wind Load with RANS Computation under Interference Effect

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ABSTRACT

Reynolds-averaged Navier-Stokes (RANS) model is an effective method for predicting wind pressure around buildings with strength on its low computational cost. However, steady RANS has limitations in predicting fluctuating components, making it unsuitable for structural design requiring consideration of fluctuating wind load. Several models have been developed to predict the fluctuating wind pressure coefficient from RANS simulation. (Selvam 1992) Despite Kalkman(2012) compared those prediction models under isolated building, there was insufficient validation of models under various conditions. This study conducted a comparison of the fluctuating wind pressure coefficient prediction model on the building under interference effect by another building. RANS simulation was conducted and accuracy of prediction models was examined. It was found that current models show unstable prediction under the effect of wake by another building. New model was proposed to improve the prediction of the fluctuating wind pressure coefficient, and its performance was compared with existing models. Fig. 1 shows the root-mean square error (RMSE) of the predicted fluctuating wind pressure coefficient with the location of the interfering building. It was found that proposed model could reduce the prediction error by the effect of wake.

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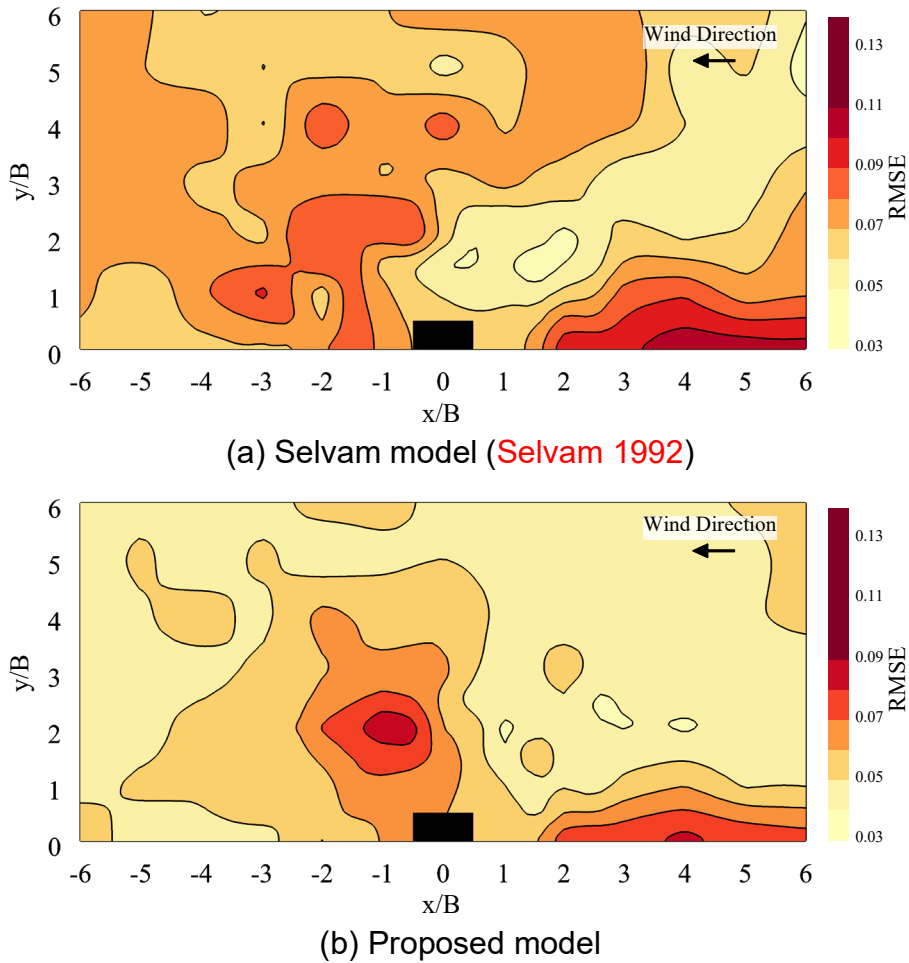


Fig. 1 RMSE of fluctuating wind pressure coefficient prediction with location of the interfering building

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