

# Unsteady Heat Flux Measurement and Predictions Using Long Short-Term Memory Networks

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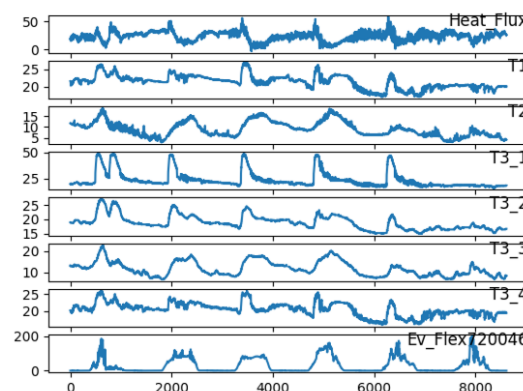
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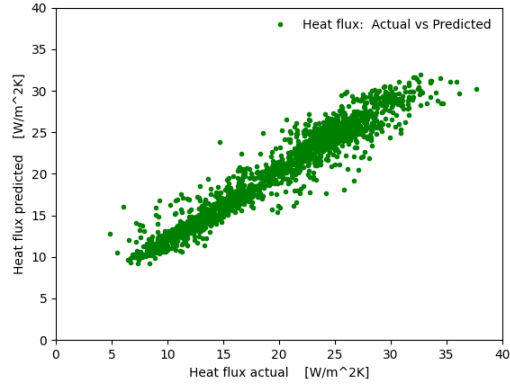
The heat flux measured through multiple windows is the model's output variable for prediction. A visualization of the variable profile is presented in the supplementary material Figure S1. Since the heat flux dynamics are repeatable, the previous values of the output variables were used as features of the model. We split the first 80% of the data into a training set, and the remaining 20% into validation and test data, respectively.

The following supporting information can be downloaded at: [www.mdpi.com/xxx/s1](http://www.mdpi.com/xxx/s1), Figure S1: Data-set for multivariate LSTM neural network analysis; Figure S2: Regression evaluation for target and prediction values using eight inputs (multistep time interval  $t_{msi} = 60$  s, 2 LSTM layers); Figure S3: Variation of target and predicted heat fluxes for test data-set (multistep time interval  $t_{msi} = 60$  s, 2 LSTM layers).

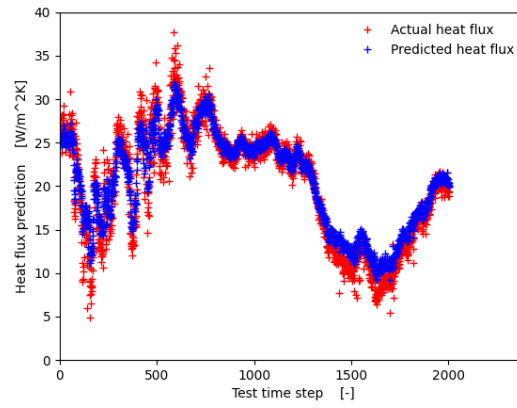
For multivariate model, computation time increased significantly. However, the overall error metric show nearly similar results. Further studies are needed to increase the accuracy and reduce the computational time used to control the system.



**Figure S1** Data-set for multivariate LSTM neural network analysis.



**Figure S2** Regression evaluation for target and prediction values using eight inputs (multistep time interval  $t_{\text{msi}} = 60$  s, 2 LSTM layers).



**Figure S3** Variation of target and predicted heat fluxes for test data-set (multistep time interval  $t_{\text{msi}} = 60$  s, 2 LSTM layers).