

Study on the Effects of Evaporation and Condensation on the Underfloor Space of Japanese Detached House using CFD analysis

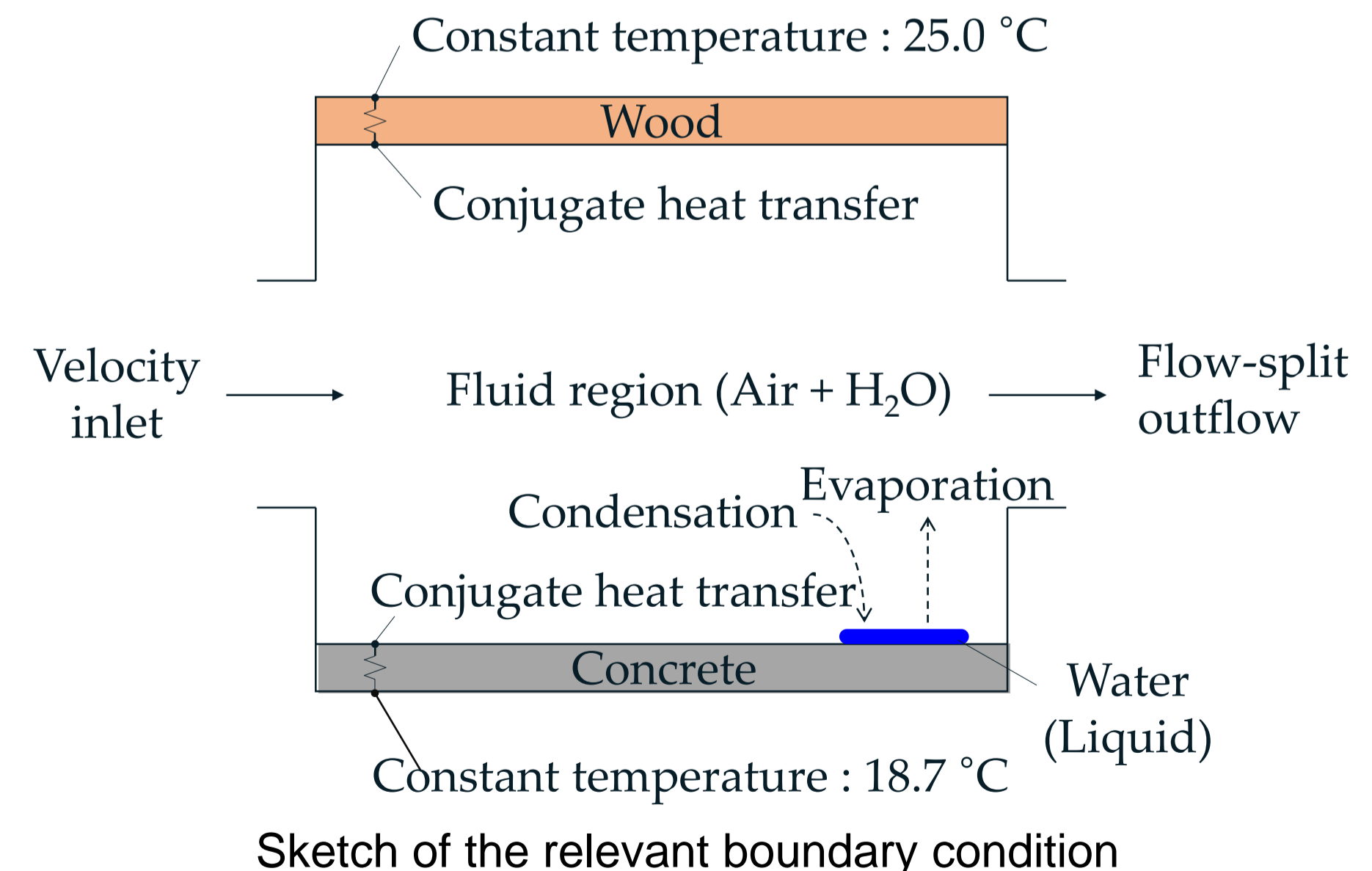
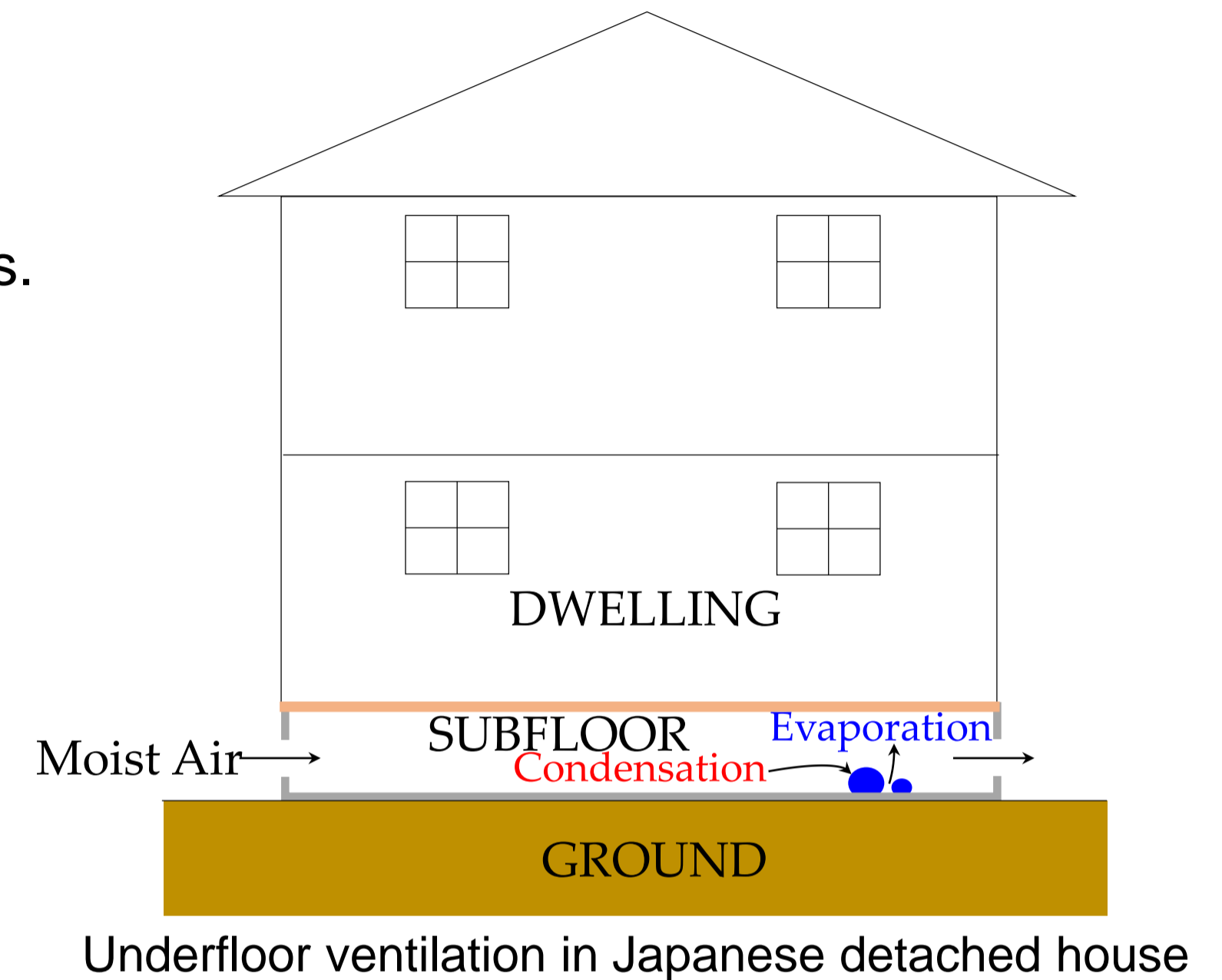
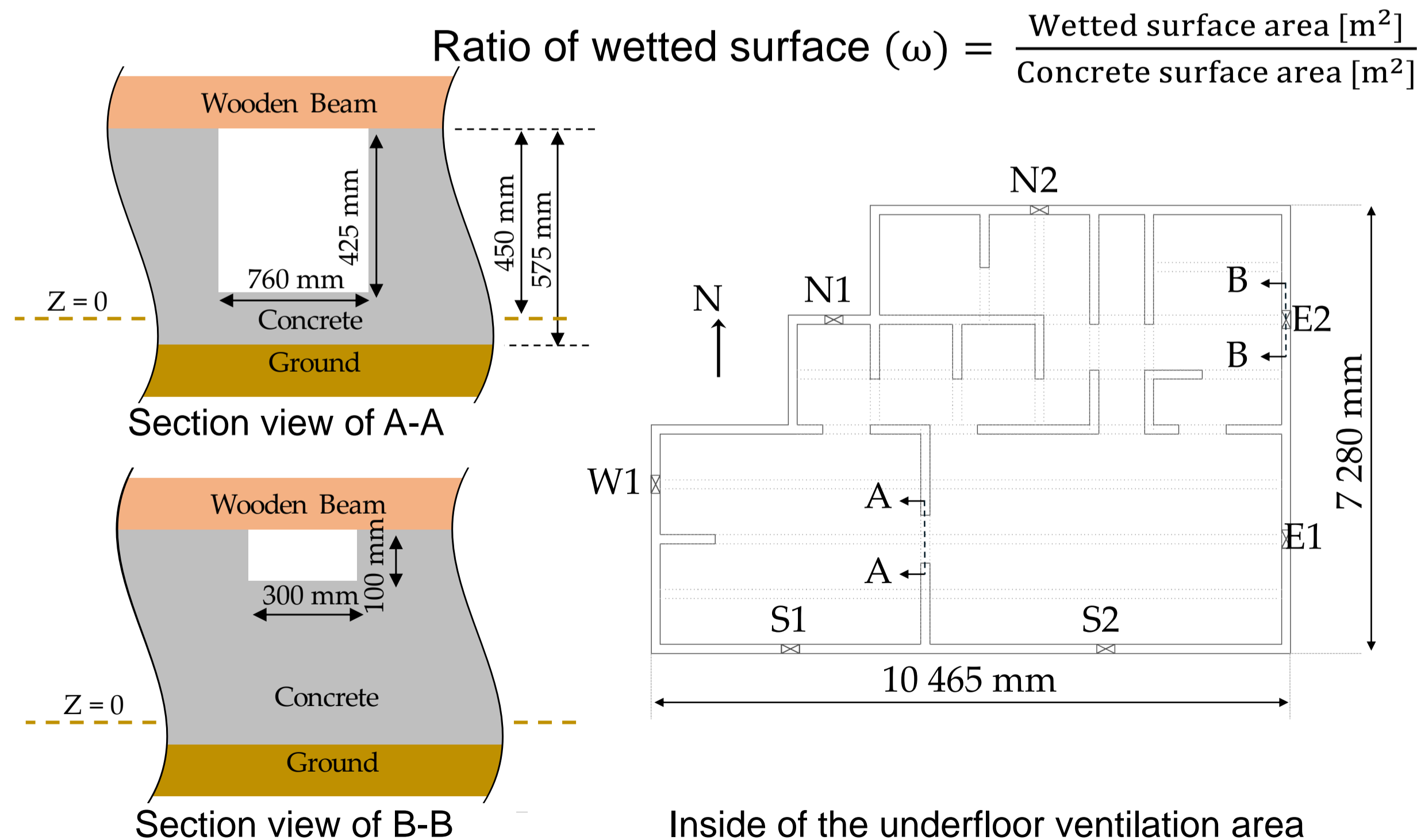
❖ Objective

The purpose of this study is to determine the effects of evaporation and condensation on the underfloor space of typical Japanese detached houses.

❖ Method

Computational fluid dynamics (CFD) analysis is applied to calculate the rates of the evaporation and condensation generated inside the underfloor.

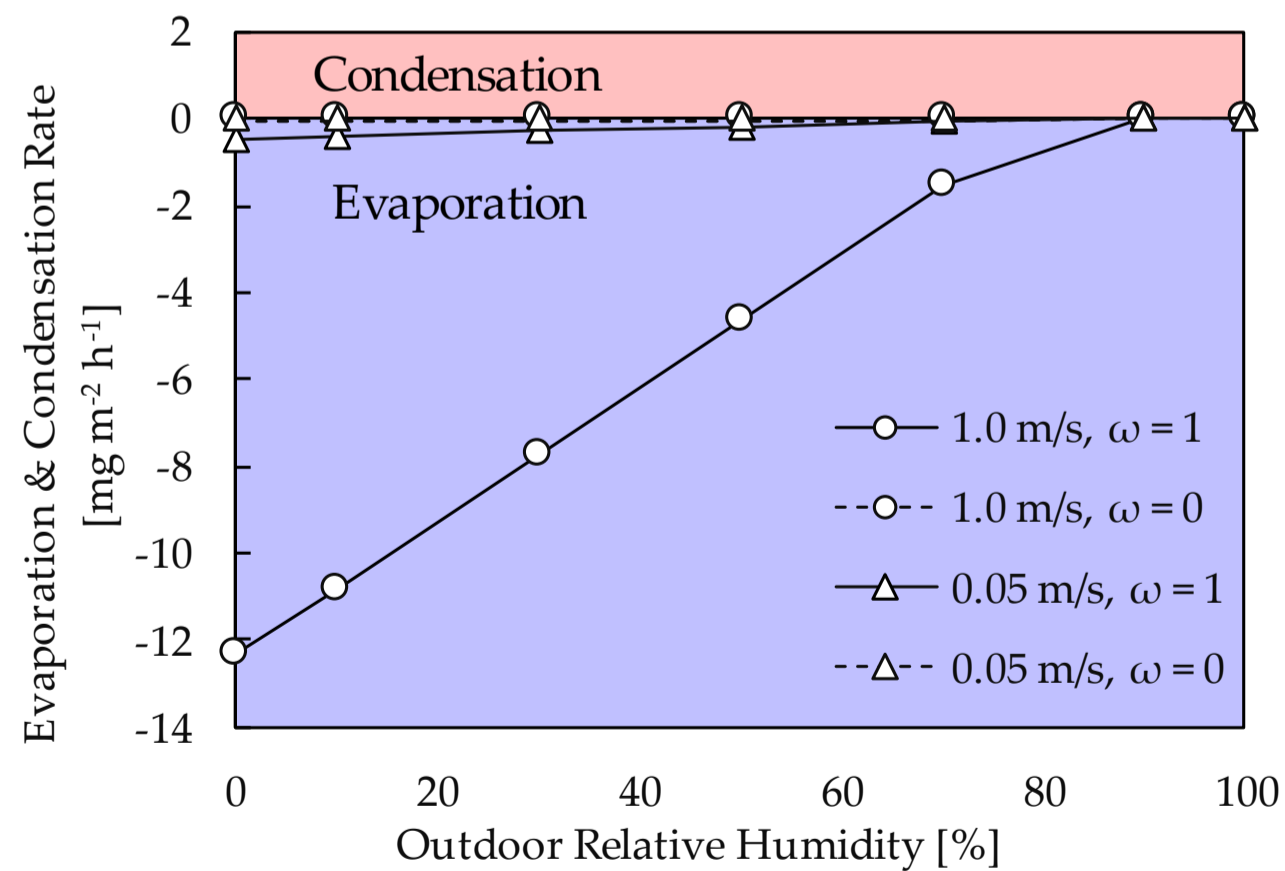
- 1) Constant environmental conditions
- 2) Fluctuating environmental conditions (24h)



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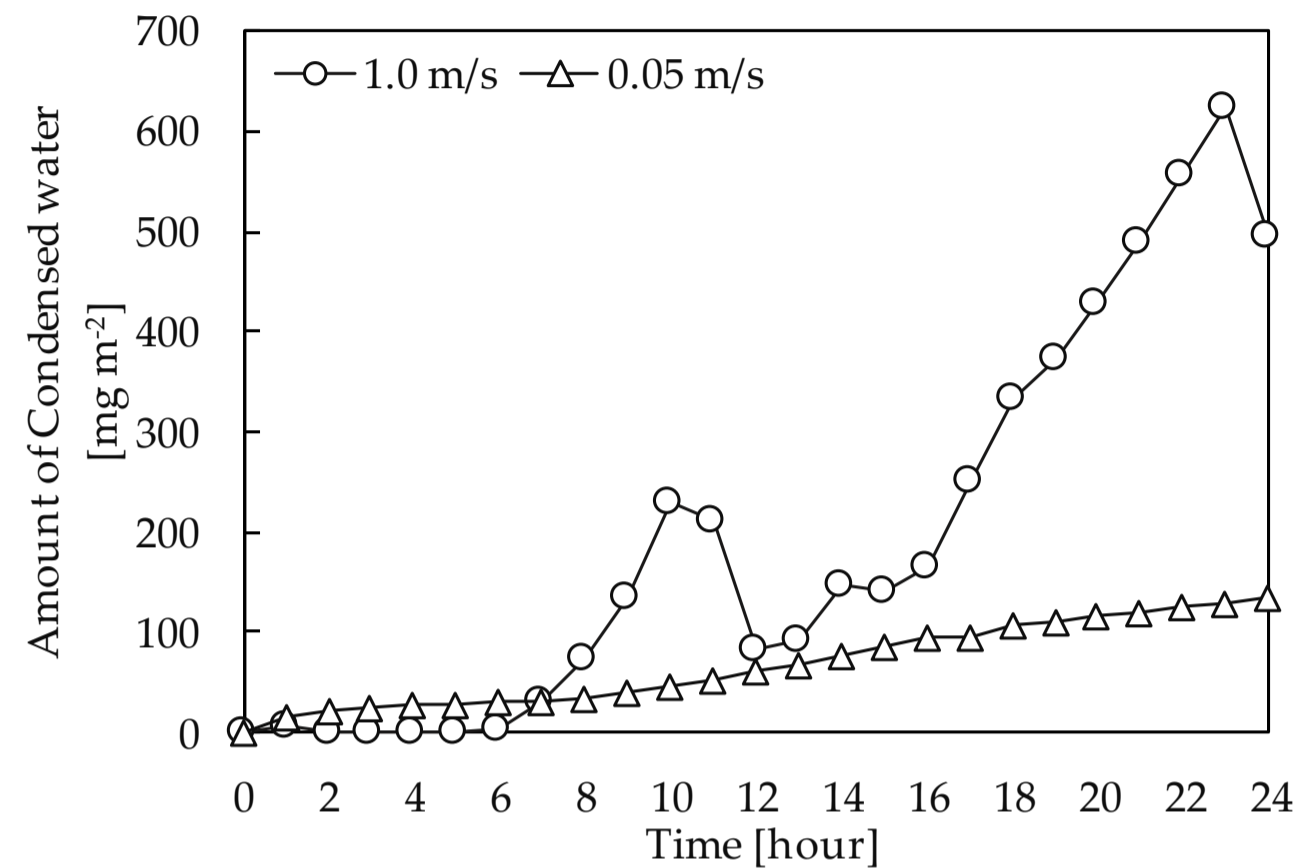
❖ Constant environmental conditions

Environmental conditions		
Outdoor condition (25 °C)		
Humidity [%]	Wind speed [m/s]	Wind direction
0	1.0	South
10		
30		
50		
70		
90		
100	0.05	South
0		
10		
30		
50		
70		
90		
100		

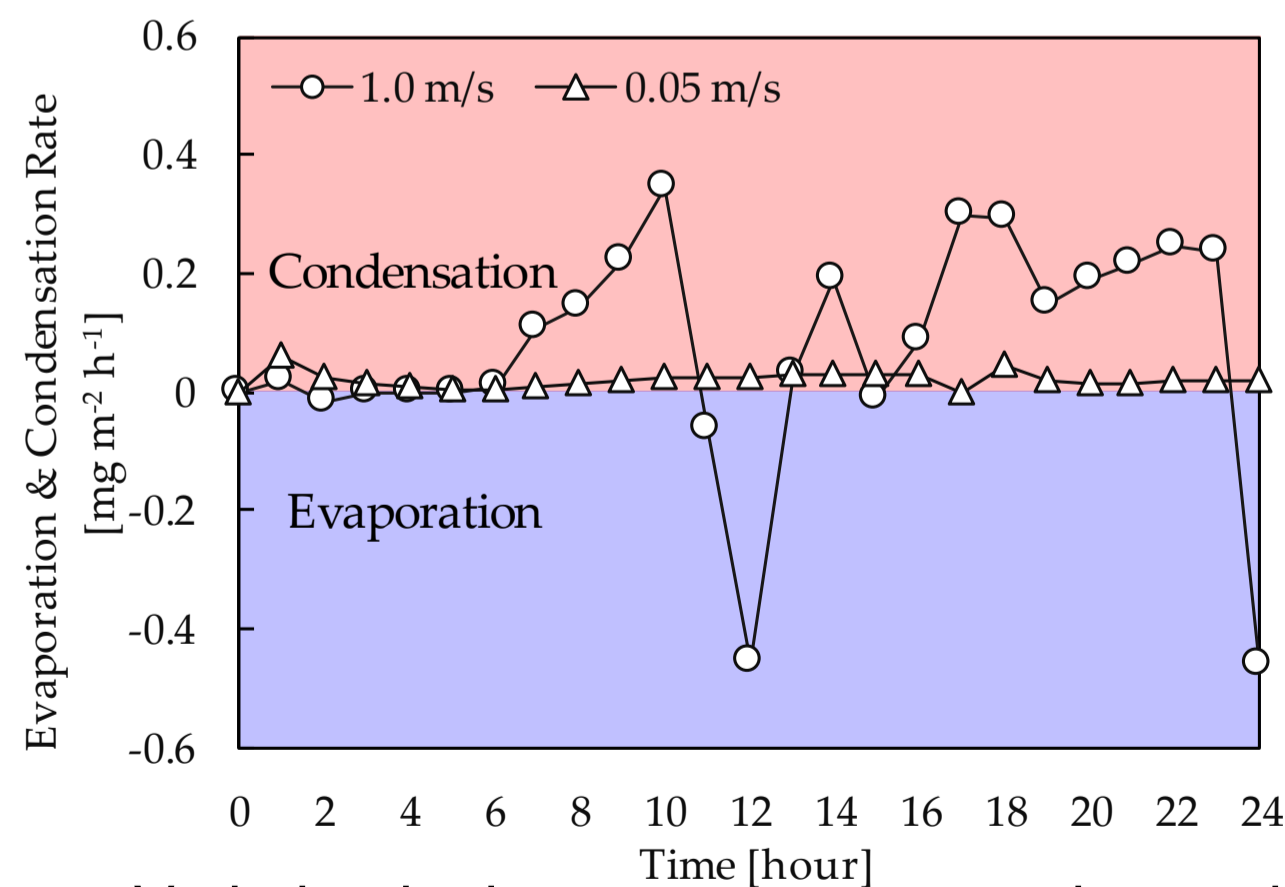


Evaporation and condensation effects relevant to the outdoor environmental conditions and RWS on the surface of the concrete on the underfloor space

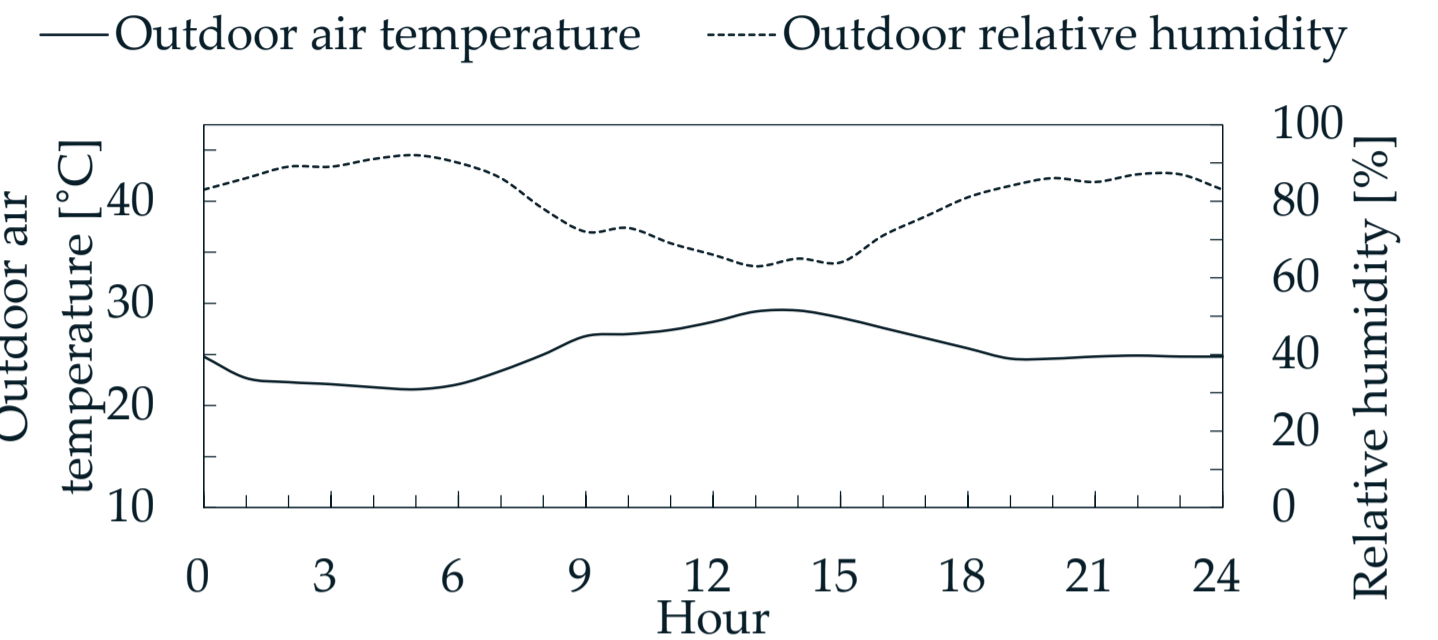
❖ Fluctuating environmental conditions



Amount of condensed water of the underfloor space relevant to evaporation and condensation during a day.

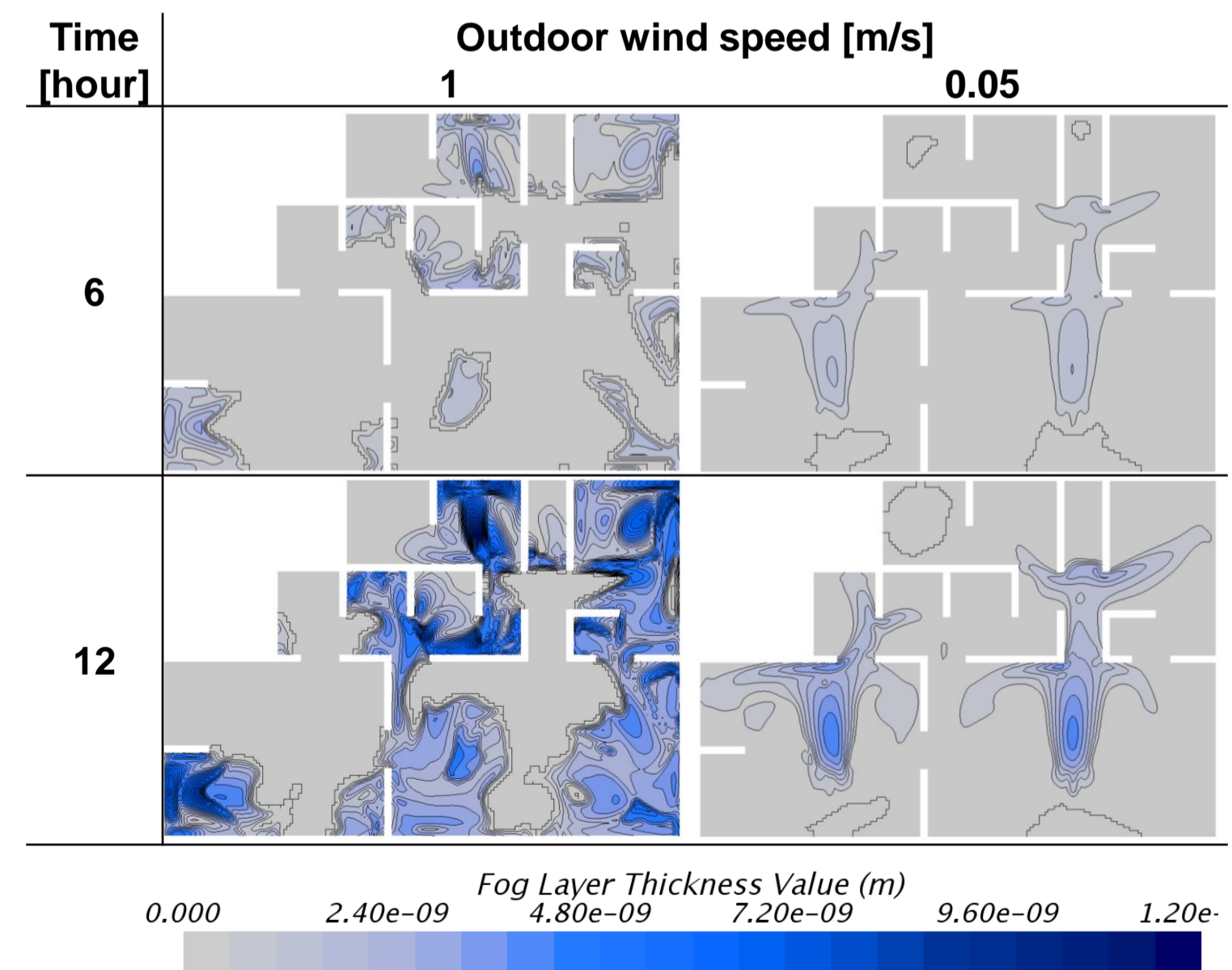


Variation in the average evaporation and condensation rate on the surface of the underfloor space during a day.



Variations in the daily outdoor air temperature and relative humidity in Tokyo, Japan (June 15).

❖ Condensation area



Variation in the condensed water thickness on the surface of the concrete during a day