



Discussion

Reply to the discussion by A. Demirbas of the paper “The effects of expanded perlite aggregate, silica fume and fly ash on the thermal conductivity of lightweight concrete”[☆]

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The authors wish to thank Prof. Demirbas for his comments on our paper. In our study, we were not directly interested in the relationship between the density and the thermal conductivity (TC) of lightweight concrete (LC), because Lu-Shu et al. [1] reported the relationship between TC and the density of LC. They derived a correlation between the density and TC for LC experimentally and also reported that the TC increased with increasing density. The lower density of LC due to silica fume (SF) and fly ash (FA) is probably related to the higher air content that results in less density [2], and partly to the amorphous structure of SF and FA, as indicated in Refs. [3,4]. As mentioned by Fu and Chung [2], the LC with SF is related to the high air void content that results in less density. Additionally, Demirboğa [5,6], Akman and Taşdemir [7], and Blanco et al. [8], also reported that the thermal conductivity decreased due to decreasing density of concrete, that results in an increase void content.

In our study, the samples were not exposed to the elevated temperature. They were only oven-dried at 105 ± 5 °C after 28-day curing period. Then the structural changes of cement gel did not occur. Besides, the decomposition did not occur during the drying process. As Prof. Demirbas correctly pointed out, the decomposition may occur at elevated temperature such as 735 K or above.

Of course water content (moisture) is an important factor effecting TC. However, as it was mentioned above, all the samples were oven-dried to avoid the effect of moisture content on TC.

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