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REPLY TO THE DISCUSSION OF THE PAPER
"EFFECTS OF SODIUM SULFATE CONCENTRATION ON THE SULFATE
RESISTANCE OF MORTARS WITH AND WITHOUT SILICA FUME"
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We thank Mr. Irassar for his interest in our paper. He says that crack-time (T_c) parameter and correlation factor were calculated based on our test results. He suggested that calculated parameters confirms the sensitivity of the flexural strength to the damage of sulfate attack. We are in agreement with Irassar that flexural strength is sensitive to the sulfate attack. However, it should be considered that mechanical properties were affected by the physical changes in all the cross section of specimens. On the other hand, damage of sulfate attack progresses from the surface to the interior part of material. So, cracking due to sulfate attack will be formed at the surface at early stage. Wang (1) reported that depth of transitional zone of crystal phases caused by sulfate attack is from several hundreds two several thousands micrometer. It is evident that surface of the material and related properties will be affected more severely comparing to the other properties. Changing trend of the material properties will become more similar and simultaneous as the specimen is getting thinner. The mortar prisms studied by Irassar (2) were thinner comparing to our specimens. So, it is natural to have good relations among flexural strength and sulfate attack damage for a relatively short period. There was an uncertainty for some systems studied in our research as indicated by Irassar. On the other hand, he calculated higher crack-time for the lower sulfate concentration (T_c was 60 days for the PC-NL and 112 days the PC-NM systems). If the capillary results are considered, it can be seen that severe deterioration was more earlier for the PC-NM system. Capillarity showed sharp or regular increase after 28 days for the PC-NK, PC-NL, PC-NM, PC-SF-NM and 90 days PC-SF-NL systems while the flexural strength some increases. This shows a continuous deterioration of material as crack formation on the surface. It can be expected that this process will progress into the material. According to our results, capillarity is more indicative for the evaluation of sulfate attack especially at a short period.

References

1. E. F. Irassar, Cement and Concrete Research, 20, 209, (1990).
2. J. G. Wang, Cement and Concrete Research, 24, 735, (1994).