

Abstract

Previous research indicates that the inclusion of nanosilica (NS) modifies the properties of the fresh and hardened state, compared to the traditional mineral additions. NS decreases the setting times of the cement mortar compared to silica fume (SF) and reduce of required water while improving the cohesion of the mixtures in the fresh state. Some authors estimate that the appropriate percentage of Nanosilica should be small (1 to 5% by weight) because of difficulties caused by agglomeration to particles during mixing, while others indicate that 10% by weight, if adjustments are made to the formulation to avoid an excess of self-drying and micro cracks that could impede strength. For this purpose, the present work aim to see the effect of the introduction mode of the nanosilica on the rheological and physic mechanical properties of cement mortars. In this study, NS was used either powdered with cement or in solution with the superplasticizer (Superplasticizer doped in nanosilica). Results show that the use of nanosilica powder (replacing cement on the one hand) has a negative influence on the rheological parameters and the rheological behavior of cementitious pastes. However, the introduction of nanosilica in solution in the superplasticizer (SP) was significantly improved the rheological parameters and the rheological behavior of cementitious pastes. Indeed, more the dosage of NS-doped SP increases more the shear stress and viscosities of the cementitious pastes become more fluid and manageable. A significant reduction of shear stress and plastic viscosity were observed that due to the increase in superplasticizer. A dosage of 1.5% NS-doped SP gave adequate fluidity and the shear rate was lower.