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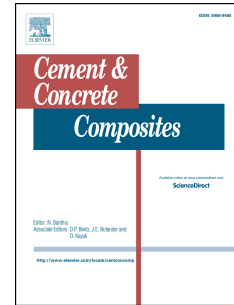
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Rheology of cement paste under high pressure

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Abstract: The objective of this study was to investigate whether cementitious materials undergo changes during pumping processes due to pressure variation. The influence of pressure on the rheological properties of cement pastes, which represented the lubricating layer that forms along the profile of concrete during pumping, was evaluated using a rotational rheometer with a high-pressure cell. Cement pastes with water-to-cement ratios ranging from 0.35 to 0.6 were tested according to a protocol designed to simulate the conditions of an actual pumping process based on field tests (i.e., shear rates, shearing durations, and pressure levels from 0 to 30 MPa). Results indicated that below a certain water-to-cement ratio (0.40) elevated pressures lead to changes in the rheological properties, while changes were negligible when the ratio was above this threshold. Further, at low water-to-cement ratios the thixotropy of the cement paste can reverse into rheopexy after pressurization.

Keywords: Cement Paste; Pumping; Rheology; Characterization; Pressure; Viscosity

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