細骨材の物理的特性が
自己充填コンクリート中のモルタルの固体粒子間摩擦に及ぼす影響

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要旨

細骨材の物理的特性が自己充填コンクリート中のモルタルの固体粒子間摩擦に及ぼす影響を定量化した。

ロート速度比 Rm と模擬骨材投入時のロート速度比 Rmb を用いた粗骨材によるフレッシュモルタルの流動性低下度の指標である 1 -Rmb/Rm を用いて、細骨材の物理的特性によるモルタルの個体粒子間摩擦影響を明らかにした。

細骨材の粒径が小さければ小さいほど、粒形が球体に近ければ近いほど、流動性の低下度は少なくなるという仮説を立てた。

細骨材粒子の大きさの指標として粗粒率を、粒子の形状の指標として粒形判定実積率(2.5mm~1.2mm)を使用し、粗粒率 F.M.＝2.0～3.5、粒形判定実積率 50～65%の範囲内の様々な粗粒率と粒形判定実積率の組み合わせを持つ細骨材を用いて試験を行い，流動性低下度 1-Rmb/Rm を求めた。モルタル中の細骨材容積比は 45%、水セメント比は 50%とした。

試験の結果、細骨材の粗粒率の増加または粒径判定実積率の低下に伴いモルタルの固体粒子間摩擦が増加する傾向が見られた。F.M.が 2.3 から 3.0 の範囲内では粗粒率が流動性低下度 1-Rmb/Rm を支配していた。

一方、粗粒率 F.M.＝2.3 を下回る細骨材と粗粒率 F.M.= 3.0 を上回る細骨材を用いた場合，粒径判定実積率のみではモルタルの固体粒子間摩擦を説明できなかった。粒径 0.15mm 以下の微粒分量が影響している可能性が得られた。

Physical Characteristics of Fine Aggregate Affecting Interaction between Solid Particles in Mortar in Self-Compacting Concrete

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ABSTRACT

Physical characteristics of fine aggregate affecting interaction between solid particles of fine aggregate in mortar self-compacting concrete was clarified.

The ratio of decrease in the funnel speed of mortar due to model coarse aggregate (1-Rmb/Rm) was employed as the index for the decrease in the flowability of mortar in self-compacting concrete (SCC) due to approaching coarse aggregate when SCC deforms in front of the narrower spacing. A hypothesis was set up in which finer particles or more spherical shape of fine aggregate particles may mitigate the degree of the interaction.

The modulus of fineness of fine aggregate was employed as the index for fineness of fine aggregate and the solid volume percentage for shape determination (diameter of 2.5 to 1.2 mm) as the index for the shape. The physical characteristics of fine aggregate used ranged from F. M. of 2.0 to 3.5 and 50% to 65% in solid volume percentage for shape determination. Both the fine aggregate content and the water to cement ratio of the mortar were fixed as 50% and 40% respectively.As the result of the experiments, the solid volume percentage for shape determination was the dominant factor for 1-Rmb/Rm and increase in F.M. or decrease in solid volume percentage for shape determination resulted in higher 1-Rmb/Rm in mortar using fine aggregate with F.M. of ranging from 2.3 to 3.0. On the other hand, the solid volume percentage for shape determination was not the dominant factor for 1-Rmb/Rm in mortar using fine aggregate with F.M. of under 2.3 or over 3.0. It may be due to the content of fine particles with the diameter of less than 0.15 mm.