

固體顆粒對賓漢流體流變參數之影響

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摘 要 本研究將不同含量 Carbopol 粉末(丙烯酸聚合物)與水混合後形成不同黏稠度的 Carbopol 漿體,經 Brookfield DV-III 型旋轉式流變計量測,結果顯示 Carbopol 漿體的流變行為符合賓漢模式。本研究將固體顆粒與 Carbopol 漿體充分混合形成固液混合漿體,以流變計量測其流變特性,探討固體顆粒含量、粒徑大小及單位重(specific weight)對固液混合漿體流變參數的影響。結果顯示 Carbopol 漿體加入適量固體顆粒後,其流變特性仍然可以用賓漢流變模式來描述,其賓漢屈服應力 τ_B 及賓漢黏滯度 μ_B 與固體顆粒含量、粒徑大小及單位重有密切之關係;混合漿體中固體顆粒含量較多者的流變參數 τ_B 與 μ_B 較大;顆粒粒徑較小者或是顆粒單位重較大者對增加混合漿體 τ_B 與 μ_B 的影響較顯著。

關鍵詞: 賓漢流體、Carbopol 漿體、賓漢屈服應力、賓漢黏滯度。

Effects of Solid Particles on the Rheological Parameters of Bingham Fluid

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ABSTRACT Carbopol-940 (acrylic polymer) powder was well mixed with taped water to form a Carbopol slurry. The rheological behavior of the slurry was measured by a Brookfield DV-III rheometer, and it indicated that the slurry has rheological behavior similar to a Bingham fluid. This study experimentally investigated the rheological properties of mixtures of solid particles and Carbopol slurry, and then analyzed the effects of solid particles on the mixture's rheological parameters, such as the Bingham yield stress τ_B and Bingham viscosity μ_B . The results show that the rheological behavior of the mixture of solid particles and Carbopol slurry still follows the Bingham model, but its rheological parameters depend on the size and specific weight of solid particles as well as on the volumetric concentration of solid particles in the mixture. The higher content of solid particles in the mixture results in higher τ_B and μ_B . The solid particles of smaller size or larger specific weight have more significant influence on the values of τ_B and μ_B of the mixture.

Conc watersheds for water resources design work.

Key Words: Bingham fluid, Carbopol slurry, Bingham yield stress, Bingham viscosit

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