剪切增稠液体的制备及冲击减振性能研究

钟发春[1],吴先前[2],王东升[3]
(1 中国工程物理研究院化工材料研究所, 绵阳 621900;2 中国科学院力学研究所, 北京 100190;3 中国工程物理研究院总体工程研究所, 绵阳 621900)

摘要:剪切增稠液体(STF)是由高固含量的纳米颗粒和高分子液体分散介质构成的一种非牛顿流体,其粘度随剪切速率的增加而增加,具有独特的冲击防护性能。本文基于纳米二氧化硅微球制备了 STF 液体,并研究了 STF 液体的减振性能和冲击波能量衰减特性。结果表明,正弦试验中加注 STF 液体的共振峰值下降约 95%~97%, 随机振动试验中加注 STF 液体的加速度均方根值下降约 38%~40%,STF 对试验件低频(<300Hz)共振减振效果显著;冲击波在 STF 中的传播波速与 STF 的厚度近似满足指数衰减规律,1-2mm 厚的 STF 液体对冲击波的能量衰减大于 50%。

关键词:剪切增稠液体(STF);减振性能;冲击波衰减

远红外陶瓷与铜锌合金协同影响饮用水理化性能的研究

杜倩倩[1],丁燕[1,2],张成成[1],王宇红[1],段昕辉[1,2]
(1. 生态环境与信息特种功能材料教育部重点实验室(河北工业大学)天津 300130;2.河北工业大学能源与环保材料研究所天津 300130)

摘要: 用远红外陶瓷与铜锌合金协同处理饮用水,然后通过核磁共振技术、差热分析方法研究水结构及理化性质。结果表明:远红外陶瓷与铜锌合金的协同作用饮用水时,远红外陶瓷辐射远红外线为水提供能量, 铜锌合金形成微电场对水分子产生干扰, 两种材料协同作用促使水分子间氢键的断裂,水分子间缔合程度降低。17O-NMR 半峰宽降低反应水分子结构变化,而 pH 值升高,氧化还原电位降低,电导率增大反应水分子理化性能变化。

关键词:远红外陶瓷;铜锌合金;氢键;理化性能

Research and Analysis on Dispersing Performance of Nano-TiO_2 Powder in Water

Ya-chuan Kuang[1, a], Wen-lei Liang[1, b], Xiao-yong Ji[2, c]
(1School of Civil Engineering, Central South University, Changsha 410075, China.2 Hunan Administration for Transportation Quality and Safety Supervision, Changsha 410075, China)

Abstract:Due tothe characteristics such as fine grain, large surface area, high surface free energy and serious insufficient of atomic coordinate, nano-TiO2 is easy to conglobated in solution and further affect its application seriously. The agglomerate mechanism of nano-TiO_2 in solution was studied and the reason of agglomeration was analyzed. Experiments were conducted to research the influence law on dispersing stability of nano-TiO_2 powder in water by factors of dispersant type, dispersant content and dispersing process of ultrasonic dispersing and high-speed stirring.The dispersing stability of nano-TiO_2 powder in water is evaluated by combining gravity deposition method with electronic microscopy analysis. According to the research, dispersant type and dispersant mixing amount have great influence on the dispersing property of nano-TiO_2 powder, and the inorganic dispersant sodium tripolyphosphate achieved betterdispersing effect. Furthermore, ultrasonic dispersing and high-speed stirring can improve the dispersing stability of nano-TiO_2 powder and after high-speed stirring at first andthen ultrasonic dispersing, the dispersing effect of nano-TiO_2 powder is much better.

Keywords: Nano-TiO_2, Dispersing stability, Dispersing agent, Ultrasonic dispersing,High-speed stirring

微波法制备纳米 $LaVO_4$ 及其光催化性能研究

钟淑妤,叶海哨,蒋纪齐,杨乾,唐培松
(湖州师范学院工学院,浙江湖州 313000)

摘要:以 $La(NO_3)_3 \cdot 6H_2O$、NH_4VO_3 和柠檬酸为主要原料,采用微波法一步直接成功制备了纳米 $LaVO_4$ 样