Patent Search

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Abstract:

A novel mathematical model designed to intricately analyze and predict bubbly flow surface interactions within multiphase systems. By considering diverse paramete liquid medium properties, bubble characteristics, and external forces, the model provides a comprehensive perspective on bubble behavior when interacting with va surfaces. With unparalleled versatility, the model can be applied across multiple industries, ranging from petrochemical processes to biomedical applications, offering into phenomena like bubble coalescence and breakup, and guiding optimization and design efforts.

Complete Specification

Description:The present invention relates generally to the domain of fluid dynamics and multiphase flow systems. More specifically, it pertains to a mathematical m approach designed to analyze and predict the interactions of bubbly flow surfaces in systems where multiple phases coexist and interact. This invention finds applic in various industries, including but not limited to, petrochemical, chemical, environmental, and biomedical fields, where understanding and control of multiphase sy are crucial. The proposed modeling framework enables enhanced comprehension of bubble behavior, interactions, coalescence, and breakup in diverse multiphase scenarios, potentially leading to optimized system designs and improved operational efficiencies.

Background of the invention:

The background of fluid dynamics and multiphase systems is a rich tapestry of scientific endeavors that spans several centuries. Historically, scientists and engineer been intrigued by the behavior of fluids, especially when they involve the interaction of different phases, such as gas bubbles in liquids. The study of such multipha has led to numerous practical applications in a variety of sectors, including the petrochemical, chemical, environmental, and biomedical industries. Each of these applications presents its own unique challenges and nuances, driving the need for a deeper understanding and better predictive models.

In the realm of multiphase systems, bubbly flows, which refer to the flow of gas bubbles in a liquid medium, are of particular interest. Bubbly flows can be found in systems, like the effervescence in geothermal springs, as well as industrial processes such as wastewater treatment, chemical reactors, and oil and gas transportatio presence of bubbles affects many aspects of the flow, from heat and mass transfer rates to turbulence dynamics. Moreover, the interaction between bubbles and s surfaces, or even with other bubbles, leads to phenomena like coalescence, where two bubbles merge into one, or breakup, where a large bubble splits into smaller These interactions play a pivotal role in determining the efficiency and effectiveness of many processes

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