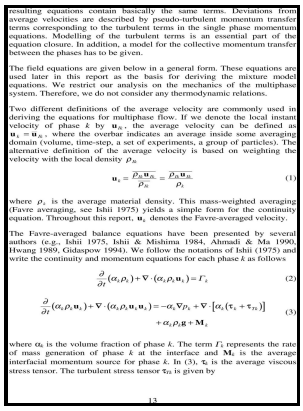
On the mixture model for multiphase flow

- - Modeling and Simulation of Multiphase Flow in COMSOL®: Part 1


resulting equations contain basically the same terms. Deviations from average velocities are described by pseudo-turbulent momentum transfer terms corresponding to the turbulent terms in the single phase momentum equations. Modelling of the turbulent terms is an essential part of the equation closure. In addition, a model for the collective momentum transfer between the phases has to be given.

The field equations are given below in a general form. These equations are used later in this report as the basis for deriving the mixture model equations. We restrict our analysis on the mechanics of the multiphase system. Therefore, we do not consider any thermodynamic relations.

Two different definitions of the average velocity are commonly used in deriving the equations for multiphase flow. If we denote the local instant velocity of phase k by $\mathbf{u}_k$, the average velocity can be defined as $\mathbf{u}_k = \overline{\mathbf{u}}_k$, where the overbar indicates an average inside some averaging domain (volume, time-step, a set of experiments, a group of particles). The alternative definition of the average velocity is based on weighting the velocity with the local density ρ_k.

$$\mathbf{u}_k = \frac{\overline{\rho_k \mathbf{u}_k}}{\overline{\rho_k}} = \frac{\overline{\rho_k \mathbf{u}_k}}{\rho_k} \quad (1)$$

where ρ_k is the average material density. This mass-weighted averaging (Favre averaging, see Ishii 1975) yields a simple form for the continuity equation. Throughout this report, $\mathbf{u}_k$ denotes the Favre-averaged velocity.

The Favre-averaged balance equations have been presented by several authors (e.g., Ishii 1975, Ishii & Mishima 1984, Ahmadi & Ma 1990, Hwang 1989, Gidaspow 1994). We follow the notations of Ishii (1975) and write the continuity and momentum equations for each phase k as follows

$$\frac{\partial}{\partial t}(\alpha_k \rho_k) + \nabla \cdot (\alpha_k \rho_k \mathbf{u}_k) = \Gamma_k \quad (2)$$

$$\frac{\partial}{\partial t}(\alpha_k \rho_k \mathbf{u}_k) + \nabla \cdot (\alpha_k \rho_k \mathbf{u}_k \mathbf{u}_k) = -\alpha_k \nabla p_k + \nabla \cdot [\alpha_k (\tau_k + \tau_{tk})] + \alpha_k \rho_k \mathbf{g} + \mathbf{M}_k \quad (3)$$

where α_k is the volume fraction of phase k. The term Γ_k represents the rate of mass generation of phase k at the interface and $\mathbf{M}_k$ is the average interfacial momentum source for phase k. In (3), τ_k is the average viscous stress tensor. The turbulent stress tensor τ_{tk} is given by

13

Description: -
-On the mixture model for multiphase flow
-
VTT julkaisuja -- 288.
VTT publications -- 288.On the mixture model for multiphase flow
Notes: SHORT ANALYTIC RECORD.
This edition was published in 1996

Filesize: 34.16 MB

Tags: #On #the #mixture #model #for #multiphase #flow #— #VTT's #Research #Information #Portal

On the mixture model for multiphase flow — VTT's Research Information Portal

VOF Volume of fluid is a model is used to simulate two or more immiscible fluids, immiscible being the operative word.

On The Mixture Model For Multiphase Flow

Best regards, Oussamane Kareemulla Dudekula February 3, 2021 Ed, I have just started exploring the COMSOL modeling capabilities; I am glad that I ran into your post; wonderful comparative summary of various modeling strategies. Amir Faghri, Yuwen Zhang, in , 2006 Comparison of MFM and MMM models The major advantage of MFM over MMM is that MFM has the potential to capture the details of each phase, including interface.

multiphase flow modeling and simulation ,Pouriya Niknam , UNIFI

LMP The Langrangian multiphase model is a subgrid model that models dispersed phases moving through a continuous phase. Numerical flow simulation utilising a full multiphase model is impractical for a suspension possessing wide distributions in the particle size or density.

On the application of mixture model for two

These methods have the benefit of being relatively inexpensive, computation-wise.

multiphase flow modeling and simulation ,Pouriya Niknam , UNIFI

For example, examining the species equation in the MFM model for Π phases and D x dimensions, and comparing it to the MMM model for the same number of phases and dimensions can show how many terms are solved Table 4. Volume fraction of solid particles in a fluidized bed modeled using the Euler—Euler multiphase flow model. Euler—Lagrange multiphase flow models in COMSOL Multiphysics are available with the add-on CFD Module and Particle Tracing Module.

On The Mixture Model For Multiphase Flow

Besides, these hydrogels are regarded as matrix-type particulate hydrogels. If the diffraction data are of above-average quality, the full-profile method can easily allow quantification of crystalline phases well below the 1 wt% accuracy level.

Related Books

- Prathāmukta o baẏaska śikshābhābanā
- Kants Metaphysik der Natur.
- Something to be proud of - the lives of Asian disabled people and carers in Waltham Forest
- Downward to the earth
- Rity rights and Eu enlargement to the east - report of the first meeting of the reflection group on