0.1 Introduction

We want to solve two phase flow air/liquid in a vertical pipe. The model is based on an Eulerian two-fluid model and a turbulence model based on the $k - \epsilon$ equations for the mixture of the two phase.

0.2 model equation

The mathematical model is given by the averaged continuity and momentum equation for each phase ϕ and the the phase average transport equation for k_c and ϵ_c where c stand for continuous.:

$$\frac{\partial \bar{\alpha_\phi}}{\partial t} + \nabla \cdot (\bar{U_\phi} \bar{\alpha_\phi}) = 0 \tag{1}$$