HLWYM HEmails

From: Amol Palekar [amol@flow3d.com]
Sent: Tuesday, August 29, 2006 6:27 PM
To: Debashis Basu
Cc: nancy.adams@swri.org
Subject: Re: Calculating Volume Fraction Dependent Viscosity in FLOW-3d

Hi Debashis,
Thanks for the wishes and Happy Ganesh Chaturthi to you!

If you are using two-fluid model with drift flux, then you have momentum exchange between fluid 1 and fluid 2.
In this case you cannot have momentum exchange between two phases for fluid 1.
So I am not sure whether the case you suggested can be modeled.
In any event, the drift flux model uses relative velocites which are functions of densities,
drag coefficient and viscosity of fluid 1. So we never change the viscosity for fluid 1.

You can find more info in section 3.2.4 of the manual.

To have two phases for a single fluid, you will need one fluid model.

The different cases for using drift flux model are :

- One fluid, variable density flows, where the fluid is a mixture of two components having densities $\rho_1$and ρ_2.
- One fluid with solidification, where the fluid is a mixture of liquid and solid having densities $\rho_1$and ρ_2.
- Two incompressible fluids having densities $\rho_1$and ρ_2.
- A compressible gas with an incompressible component. In this case the density of the compressible gas is given by an equation-of-state, while the incompressible material has density ρ_1, which is always assumed to be much larger than the gas density.

I hope this helps. Let me know if anything is missing.
Best Regards,
Amol

> ----- Original Message -----
> **From:** Debashis Basu
> **To:** amol@flow3d.com
> **Cc:** nadams@swri.edu
> **Sent:** Tuesday, August 29, 2006 3:47 PM
> **Subject:** Calculating Volume Fraction Dependent Viscosity in FLOW-3d
>
> Hello Amol,
>
> Hope you are doing fine. I have a small question.
>
> I know that FLOW-3D solves a time dependent equation for volume fraction.
>
> Suppose I am using a two-fluid model. The first fluid is a mixture (60% volume fraction water vapor and 40% volume fraction solid, as in the magma say) and the second fluid is air.

Now I am also activating the drift flux model to enable momentum exchange between the water vapor and the solid fractions.

My question is how is the viscosity computed for the mixture of water vapor and solid.

Because the viscosity of the magma mixture changes with the volume fraction of the water vapor, I am thinkign whether that is accounted for in
FLOW-3D.

Kindly let me know.

Best wishes for the Ganesh Chaturthi.

Regards

Debashis

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Subject: Re: Calculating Volume Fraction Dependent Viscosity in FLOW-3d
Sent Date: 8/29/2006 6:26:45 PM
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From: Amol Palekar

Created By: amol@flow3d.com

Recipients:
"nancy.adams@swri.org" <nancy.adams@swri.org>
Tracking Status: None
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Tracking Status: None

Post Office: AMOL64

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MESSAGE	2482	8/29/2006 6:27:23 PM

Options
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Return Notification: No
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