From: Randall Fedors
Sent: Wednesday, October 17, 2007 8:31 AM
To: James Winterle; Jin-Ping Gwo
Cc: Jude Mcmurry; Scott Painter; Hakan Basagaoglu; John Bradbury; 'cmanepally@swri.edu'
Subject: Re: matrix diffusion workshop report section

2. Dual-porosity concept is similar to dual-K, except that there is no transfer between matrix cells (no matrix to matrix flow) for dual-porosity. I believe this is the definition generally accepted in the literature, but I'm open to the experience of others.

3. I think we misunderstand each other. By restrict, I do not mean totally disallow. The disequilibrium in matric pressure (water potential) between fracture and matrix is created by the AFM, thus the "restriction." I am referring to the fracture-matrix interaction area being reduced for fracture to matrix flow; but the area is not reduced for matrix to fracture flow. The reduction in fracture-matrix interaction area conceptually addresses flow processes such as rivulet flow, flow in some fractures but not others, and flow in some portions of fractures but not other portions. My intent of the comment relates to linking this writeup with parts of the report that will discuss the AFM affect on transport. And also, because the figure made me think of my last question, the one on matrix diffusion accounting for the reduced area between fracture and matrix. The DOE does account for this by sampling the gamma (exponent of AFM) for transport (note that the water flow uses a single, deterministic value for gamma). So, presumably, DOE could readily account for matrix diffusion depending on the direction (fracture to matrix, or matrix to fracture), analogous to the flow implementation.

--Randy

>>> Jin-Ping Gwo 10/17/2007 8:08 AM >>>
Randy,

Thanks for the comments. Let me address them, which may not be satisfactory to everyone, but it's my two-cents.

1. I used to call the kind of model 'single-fracture model.' If okay to folks here, I'd be happy to change to that.

2. In the FEHM numerical model, they indeed call it dual-permeability, dual-porosity - in a sense that matrix does have porosity of its own. I believe this is also their conceptual model as well. DOE's particle tracking AMR uses dual-k to refer to this model. I'll be happy to change the terminology as well.Du

3. I do not recall active fracture flow model restricts mass being transfer unidirectionally from fracture to matrix. That would violate fundamental physical understanding that mass is transferred via a physical gradient, either pressure or concentration, thermodynamically. In looking into FEHM input files for UZ, I did see interflow going both directions. DOE's particle tracking AMR also suggests that diffusion could be going both directions as well. Otherwise, if TSPA is to release all radionuclides into the matrix, they would stay in UZ much longer. Again, I'd be happy to change the write-up if that is what DOE suggests.

Regards,
Jack

>>> Randall Fedors 10/17/2007 7:41 AM >>>
Jack,

See attached for some comments that came to mind. The comment on the discrete fracture model terminology is one that we as a group need to reconcile.
--Randy

>>> Jin-Ping Gwo 10/16/2007 10:37 AM >>>
Jim,

Thanks. When I did the figure years ago, I had in mind the pressure gradient is from fracture to matrix. I'll modify that.

Regards,
Jack

>>> < jwinterle@cnwra.swri.edu > 10/16/2007 10:02 AM >>>
Jack,
I like what you wrote. It is a clear and succinct summary of the DOE approach. I notice in figure G-1, that the advection arrows both point in the same direction; I think they should the show both directions like the diffusive arrows do.

I am almost finished writing a summary of the DOE's EBS Transport Model with a similar level of detail. The EBS transport model also includes matrix diffusion and probably results in significant credit --perhaps as much or more attenuation of transport than in the UZ. So, it is definitely worth discussing in the report. Another feature of the EBS transport model is that it is implemented entirely in GoldSim and would be fairly easy to reproduce the model. I expect to have the summary finished this week.

--Jim

----- Original Message -----
From: Jin-Ping Gwo < jxg4@nrc.gov >
Date: Monday, October 15, 2007 4:02 pm
Subject: matrix diffusion workshop report section

> Jim,
>
> Attached please find a write-up of the alternative conceptual model
> section. Please feel free to edit.
>
> Jude,
>
> I veered from the TSPA-SR/FEIS because of dated information. The
> TSPA-SEIS model, if available soon, should give a better perview
> of the
> TSPA-LA model. As I can tell from the most recent FEHM model available
> to us, transfer functions indeed are one of the critical set of inputs
> for matrix diffusion calculations. If TSPA-LA uses the most recent
> FEHMcode, then their calculations in the particle tracking AMR should

> roughly correspond to their TSPA-LA results. I still cannot completely
> agree with the initial conditions they used for the conditional
> transferfunctions at grid-scale, but the overall impact to model
> uncertainty may
> be minor. I'll have to do a stand-alone FEHM calculation to
> determine if
> that's the case though.
>
> Regards,
>
> Jin-Ping (Jack) Gwo
> Systems Performance Analyst
> U. S. Nuclear Regulatory Commission
> Phone: 301-492-3178
> Fax: 301-492-3357
>

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Mail Envelope Properties (Randall.Fedors@nrc.gov20071017083055)

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Sent Date: 10/17/2007 8:30:55 AM
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"Jude Mcmurry" <jmcmurry@cnwra.swri.edu>
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