HLWYM HEmails

From: John Bradbury
Sent: Tuesday, March 04, 2008 10:09 AM
To: LSNReviews
Subject: Fwd: RE: Comments on SDS 3.01 Response
Attachments: TEXT.htm

>>> John Bradbury 12/20/2007 9:43 AM >>>
Hakan: I'm mixing certain tasks here. I don't suggest that we discuss fractals in the review of DOE's response to SDS 3.01... I'm also busy trying to write a section on the matrix diffusion workshop report. So I'm looking at the evidence DOE uses in the AMR Conceptual Model and Numerical Approaches for Unsaturated Zone Flow and Transport, 2004. That's where they use the fractal evidence to support the AFM. This latest paper Liu, Zhang, Zhou, and Molz seems to try and address self-similarity and scale dependency. I haven't finished reading it. Just seems like they are skating on thin ice.

Sorry that I confused you with my comment. It had to do the 2004 AMR and not DOE's response to SDS 3.01.

John

>>> hbasagaoglu <hbasagaoglu@cnwra.swri.edu> 12/19/2007 6:54 PM >>>

Thanks John (and the others) for your comments.

As for the AFM fractal considerations, Liu et al. acknowledged in their 2003 and 2005 journal articles the fractal expression -they came up with- for the AFM exponent requires further analyses and data support.
Therefore, I was reluctant to refer to their fractal expression. If the expression was supported and validated by lab or field data, we could have a much stronger argument on the lack of fracture-informed analyses for the AFM exponent.

The fractal analyses basically accounts for the scale-dependency of a specific parameter. If the active fracture model exponent displays a fractal behavior (self-similarity at different scales), then it should be able to account for the scale-dependency of the fracture-matrix interfacial area, and hence for the scale-dependency of the matrix-diffusion coefficient. In this case, the question would be why DOE bothers with a fudging factor of diffusion enhancement factor to account for 'scale-dependency' of the matrix diffusion coefficient while the fractal (scale-dependent) active fracture model exponent can already account for the scale-dependency effect.
But, because Liu et al.
did not make any "strong" assertions about the fractal representation of the AFM exponent, I thought it may not be fair to refer to their journal articles.

If we do so, they may say, well these are just independent exploratory studies and do not necessarily support any of our TSPA and site-scale numerical models (they had the same response in the Appendix 7 meeting when I asked them if they would use a fractal exponent of ~1.7 they estimated for Yucca Mountain in their 2004 (in VZJ) article for studying the scale-dependency of the effective matrix diffusion coefficient).

Hakan

-----Original Message-----
From: John Bradbury [mailto:JWB@nrc.gov]
Sent: Wednesday, December 19, 2007 3:00 PM
To: Hakan Basagaoglu

Cc: Jude McMurry; Jack Guttmann; Jin-Ping Gwo; Philip Justus; Randall Fedors
Subject: Comments on SDS 3.01 Response

Hakan: I have a few comments. I agree with the comment about the on flow lateral boundaries. Salve, 2005 suggests a lateral component of gravity driven flow is observed. The assumption that permeability is isotropic is questionable since Salve suggests most lateral flow is dictated by the geometry of the fracture network. The point made by Jack that the distribution of flow when ponding occurs can be significantly different from what is anticipated in the repository seems reasonable.

I agree with your comment on the added enhancement factor takes away from the simplicity of the AFM and thus makes the conceptual model less robust, more uncertain. If DOE thinks a factor of 45 is appropriate for enhancing the effective diffusion coefficient, I'd like to see how that impacts the original water distribution used to calibrate the AFM (Liu et al 1998).

Finally, I can imagine that DOE will end up using senstivity analyses to show the effect of matrix diffusion on performance. This was the way they did it in the SZ. There, they showed the effect as a function of fracture spacing. The effect when the fracture spacing was 21m was close to that when the spacing was infinite. With that demonstration, the NRC considered the SZ matrix diffusion concern closed.

I note DOE has related the AFM to fractal considerations. The use of fractals is meant to describe the self similarity of the system on different scales. DOE claims there are countless fractures on smallller scales which affect matrix diffusion. Once they have convinced the reader of this relationship, it seems antithetical to then claim that matrix diffusion is scale dependent. I see this as the 2 arguments cancelling each other out, and I am left with nada.

John

Hearing Identifier: HLW_YuccaMountain_Hold_EX
Email Number: 319

Mail Envelope Properties (bb14a22a-93f2-43ad-9b50-4771d37e848e)

Subject: Fwd: RE: Comments on SDS 3.01 Response
Sent Date: 3/4/2008 10:09:00 AM
Received Date: 3/4/2008 10:11:15 AM
From: John Bradbury

Created By: John.Bradbury@nrc.gov

Recipients:
"LSNReviews" <LSN.Reviews@nrc.gov>
Tracking Status: None

Post Office:

Files	**Size**	**Date & Time**
MESSAGE	4677	3/4/2008 10:11:15 AM
TEXT.htm	6253	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

>>> John Bradbury 12/20/2007 9:43 AM >>>
Hakan: I'm mixing certain tasks here. I don't suggest that we discuss fractals in the review of DOE's response to SDS 3.01... I'm also busy trying to write a section on the matrix diffusion workshop report. So I'm looking at the evidence DOE uses in the AMR Conceptual Model and Numerical Approaches for Unsaturated Zone Flow and Transport, 2004. That's where they use the fractal evidence to support the AFM. This latest paper Liu, Zhang, Zhou, and Molz seems to try and address self-similarity and scale dependency. I haven't finished reading it. Just seems like they are skating on thin ice.

Sorry that I confused you with my comment. It had to do the 2004 AMR and not DOE's response to SDS 3.01.

John

>>> hbasagaoglu <hbasagaoglu@cnwra.swri.edu> 12/19/2007 6:54 PM >>>

Thanks John (and the others) for your comments.

As for the AFM fractal considerations, Liu et al. acknowledged in their 2003 and 2005 journal articles the fractal expression -they came up with- for the AFM exponent requires further analyses and data support.
Therefore, I was reluctant to refer to their fractal expression. If the expression was supported and validated by lab or field data, we could have a much stronger argument on the lack of fracture-informed
analyses for the AFM exponent.

The fractal analyses basically accounts for the scale-dependency of a specific parameter. If the active fracture model exponent displays a fractal behavior (self-similarity at different scales), then it should be able to account for the scale-dependency of the fracture-matrix interfacial area, and hence for the scale-dependency of the matrix-diffusion coefficient. In this case, the question would be why DOE bothers with a fudging factor of diffusion enhancement factor to account for 'scale-dependency' of the matrix diffusion coefficient while the fractal (scale-dependent) active fracture model exponent can already account for the scale-dependency effect. But, because Liu et al. did not make any "strong" assertions about the fractal representation of the AFM exponent, I thought it may not be fair to refer to their journal articles.
If we do so, they may say, well these are just independent exploratory studies and do not necessarily support any of our TSPA and site-scale numerical models (they had the same response in the Appendix 7 meeting when I asked them if they would use a fractal exponent of ~1.7 they estimated for Yucca Mountain in their 2004 (in VZJ) article for studying the scale-dependency of the effective matrix diffusion coefficient).

Hakan

> -----Original Message-----
> **From:** John Bradbury [mailto:JWB@nrc.gov]
> **Sent:** Wednesday, December 19, 2007 3:00 PM
> **To:** Hakan Basagaoglu
> **Cc:** Jude McMurry; Jack Guttmann; Jin-Ping Gwo; Philip Justus; Randall Fedors
> **Subject:** Comments on SDS 3.01 Response
>
> Hakan: I have a few comments. I agree with the comment about the on flow lateral boundaries. Salve, 2005 suggests a lateral component of gravity driven flow is observed. The assumption that permeability is isotropic is questionable since Salve suggests most lateral flow is dictated by the geometry of the fracture network. The point made by Jack that the distribution of flow when ponding occurs can be significantly different from what is anticipated in the repository seems reasonable.
>
> I agree with your comment on the added enhancement factor takes away from the simplicity of the AFM and thus makes the conceptual model less robust, more uncertain. If DOE thinks a factor of 45 is appropriate for enhancing the effective diffusion coefficient, I'd like to see how that impacts the original water distribution used to calibrate the AFM (Liu et al 1998).
>
> Finally, I can imagine that DOE will end up using senstivity analyses to show the effect of matrix diffusion on

performance. This was the way they did it in the SZ. There, they showed the effect as a function of fracture spacing. The effect when the fracture spacing was 21m was close to that when the spacing was infinite. With that demonstration, the NRC considered the SZ matrix diffusion concern closed.

I note DOE has related the AFM to fractal considerations. The use of fractals is meant to describe the self similarity of the system on different scales. DOE claims there are countless fractures on smalller scales which affect matrix diffusion. Once they have convinced the reader of this relationship, it seems antithetical to then claim that matrix diffusion is scale dependent. I see this as the 2 arguments cancelling each other out, and I am left with nada.

John