Working Group 5 - Modeling Workshop

Methodology for Stimulation of EGS

Goals of WP5

- **Developments and diagnosis of methods to develop permeabilities**

- **Optimization of Efficiency**

- **Optimization of environmental and safety issues (microseismicity!)**

Short-term contributions of the participants

➢ Main identified difficulties and guidelines for solutions

➢ Support to EHDRA and to the Soultz project partners

Publication

➢ Peer review committee for publications

➢ Exchanges with other working groups

Modeling Workshop
01 June 2005

Participating members:

- Blaisonneau, A., BRGM - Orléans
- Champel B., EIFER - Karlsruhe
- Cuenot, N., EEIG - Soultz
- Evans, K., ETH - Zürich
- Gentier, S., BRGM - Orléans
- Gérard, A., EEIG - Soultz
- Jung, R., GGA - Hannover
- Peirano, E., ADEME - Valbonne
- Pfender, M., BGR - Hannover
- Royer, J.J., CRPG-CNRS - Nancy
- Tischner , T., BGR - Hannover
- Vörös, V., Q-Con - Bad Bergzabern

Modeling Workshop
01 June 2005

GEOWATT AG

Jean-Jacques Royer, CNRS-CRPG Nancy:

➢ Long term Geothermal Performance Modeling using an Equivalent Porous Medium Approach: advances and limits

Dominique Bruel, Armines

➢ Prediction concerning the test of June

Sylvie Gentier, BRGM

➢ New modelling for transport on complex fault systems

Possible topics (not limitative) :

➢ differences between the models and their meaning,

➢ relevance of the concepts,

➢ possibility to test the concepts,

Thomas Kohl, Geowatt

➢ Predictive modeling of hydraulic induced shearing

Modeling Workshop
24 November 2005

Modeling of Tracer Tests

Time	Author	Topic
09:00	Thomas Kohl (Geowatt)	Welcome (organization / publications)
09:15	N. Cuenot M. Pfender (GEIE)	Overview of current activities
09:35	André Gérard (GEIE)	Various conceptual models at Soultz
09:55	Bettina Albers; Torsten Tirschner ; (GGA)	First results of tensile fracture modeling of GPK4 stimulation in September 2004 using "Fieldpro"
10:10	Michel Rosener; Yves Géraud; (EOS)	Modeling altered damage zone using the code "Code-bright"
10:30		Discussion
10:50		*Break*
11:10	Clément Baujard; Dominique Bruel (Armines)	Integration of recent tracer results to calibrate a Discrete Fracture Network model and obtain an estimation of the volume of the Soultz reservoir
11:30	Thomas Mégel et al. (Geowatt)	Interpretation of Productivity and Injectivity Indexes from current circulation data
11:45	Thomas Kohl et al. (Geowatt)	Interpretation of 2005 hydraulic tests
12:00		Discussion
12:30		*Lunch*
13:30	Laurent André; Francois Vuataz; (Crege)	Acid treatments in geothermal reservoirs: A bibliographic review & numerical simulations on the Soultz EGS reservoir
13:50	Pete Rose	Soultz Tracer Test Data
14:20	Jean Louis Pinault; Sylvie Gentier; Bernard Sanjuan; (BRGM)	Interpretation of 2005 tracer test data
14:40	Everybody	Discussion
15:40	André Gérard (GEIE)	Future steps
15:50	Everybody	Any other business

Discussion of downhole measurements/calculations

Accuracy (absolute/relative)

- ➢ Which accuracy is necessary for interpretation?
- ➢ Which accuracy is achieved through measurements?

Which accuracy can be obtained through pressure extrapolation from wellhead?

Conclusion

Main achievements:

- ➢ Support of Core Team in Soultz
- ➢ Analysis of data from actual operation
  - • Circulation test,
  - • GPK4 Injection / Production tests
  - • GPK3 Injection tests
  - • Evaluation of improvement
- ➢ Predictive modeling

New Questions:

- ➢ Accuracy of data
- ➢ Quality control of data

Special Issue on Modeling: Geothermics Jan. 2007

- ➤ Gérard A., Genter A., Kohl T., Lutz Ph., Rose P., Rummel F., The deep EGS (Enhanced Geothermal System) project at Soultz-sous-Forêts (Alsace, France), Editorial

- ➤ Auradou H., Drazer G., Hulin J-P & Koplik J., Numerical and experimental studies of the effect of shear displacement on the transport properties of a single fracture

- ➤ Baujard C. & Bruel D., Recent results on the impact of fluid density on the pressure distribution and stimulated area in the Soultz reservoir(s) using a finite volume numerical code

- ➤ Champel B., Influence of brine density variations on buoyancy effect in geothermal wells

- ➤ Dornstädter J., Heidinger P., HDR economic modelling : The HDRec Software

- ➤ Megel Th., Kohl Th., Hopkirk J.R., The potential impact of the use brine for initial stimulation phase.