

Error Model Maintenance Sub-committee

ISCWSA 39

Long Beach, Ca.

9 May 2014

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History of the ISCWSA Error Model

- SPWLA MWD conference - request for better position uncertainty estimates, 1995
- Formation of the ISCWSA, 1995
- MWD error model
 - SPE 56702 MS, 1999
 - SPE 67616 PA, 2000 (56702 peer reviewed)
- Gyro error model
 - SPE 90408 MS, 2004
 - SPE 90408 PA, 2007 (90408 MS peer reviewed)

History (cont'd)

- The Error Model Maintenance sub-committee
 - ISCWSA 21, 2005
- Revisions to the MWD model
 - Rev 3, 2009
 - Definitions provided on ISCWSA.org site

What is “the ISCWSA Error Model”?

- Currently it is two separate “General” models
 - Magnetometer based tools (MWD)
 - Gyro based tools
- General models describe significant error sources and how they propagate, but do not quantify the errors
- “Tool” models populate a General model with error term values appropriate to a particular survey system

The MWD Model

- MWD systems are very similar
- The largest errors are generally common to all systems
 - pipe tally
 - BHA
 - reference field
- This allowed ISCWSA members to agree on a set of generic input values
 - i.e. a generic MWD Tool Model
- SPE 67616 describes several variants
 - Floating drilling installation
 - BHA sag corrected
 - BHA axial interference corrected
 - But not IFR

The MWD Model

- Individual service providers can:
 - Specify their own Tool models
 - Add variants not covered in 67616 (e.g. IFR)
 - **These are not “the ISCWSA error models”**, they are proprietary models built using the ISCWSA General model
- The generic model serves as a benchmark and a fall-back
- Compliance with the General model facilitates sharing of proprietary models
- Unfortunately some MWD companies have also introduced new terms
 - i.e. deviation from the General model
- Better to propose additions/amendments to the General model

The Gyro Model

- Accommodates all known downhole gyro systems
- Gyro systems vary greatly
- Common environmental errors are not so dominant as for MWD
- Therefore no generic Tool models
- SPE 90408 provides 6 example models representative of the different types of system
 - Not generic tool models
 - **These are not “the ISCWSA error models”**
 - Only provided to allow testing of software implementation

Landmark Compass Software

- Most widely used directional software
- Shipped with the Halliburton set of error models
- **These are not “the ISCWSA models”**
- The only ISCWSA Tool models are the several variants of the generic MWD model

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Operator Wellbore Survey Group

- The OWSG has specified a comprehensive set of Tool error models
- Available to the Industry
- The models are not endorsed by the ISCWSA
 - **They are not “the ISCWSA error models”**
 - May become a di facto standard set over time
- Generic models are conservative
- Suppliers are invited to provide their Tool specific models
 - Must conform to OWSG General error model
- Currently the OWSG General model includes non-ISCWSA terms
 - Alignment between the two is desirable

Survey QC

- 2007, the ISCWSA realised that the MWD model was being misused
 - Survey data of unknown or poor quality was being assigned the ISCWSA generic model
- ISCWSA addressed this via SPE paper 133417, 2009
 - Principle applies to any error model
 - Surveys must be tested for compliance with the relevant model's assumptions

What Next?

- Consolidate MWD and Gyro into single General model
 - Write single comprehensive description of consolidated General model and generic MWD models
 - Include advice on implementation
 - Revise document as model evolves
 - Archive the history
 - Available on ISCWSA.net
 - Initial work done
 - JIP eBook “Introduction to Wellbore Positioning”
- Establish formal process for evaluating recommendations for change

Summary

- ISCWSA model provides an Industry standard General error model
 - Accommodating all current and past survey tools
 - Describes performance under varying operating conditions
- ISCWSA maintains model
 - Keeps it current
- Suppliers/Operators specify Tool models using ISCWSA General model
- MWD Generic Tool model serves as benchmark for proprietary MWD models
- Not quite there yet
 - ISCWSA and Supplier/Operator models must be aligned
- OWSG offers comprehensive set of generic Tool models
 - Not “the ISCWSA models”
 - Generic models should be conservative
- **Don't forget need for link between model and survey validation**
- There is no error model panacea