ISCWSA / SPE Wellbore Positioning Technical Section

Error Model Maintenance Work Group

Minutes of the Meeting at ISCWSA #53, Online, 12th April 2021

Present

Andy McGregor	H&P	Mike Calkins	Three Sigma
Jon Bang	Gyrodata	Jerry Codling	Halliburton
Harry Wilson	Baker Hughes	Jonathan Lightfoot	Occidental
Darren Aklestad	SLB	Anne Holmes	Halliburton
Phil Harbidge	Pathcontrol	Dalis Deliu	Conoco Phillips
Mike Attrell	Mostar	Levi Smith	Icefield Tools
Eric Maynard	EQT	Orlando Ramirez	Stockholm Precision
Gunnar Tackman	Baker Hughes	Brett Van Steenwyck	SDI
Phil Scott	DGI	Adrian Ledroz	Gyrodata
Denis Reynard	Pathcontrol	Harold Bolt	Depth Solutions
Shuba Love	H&P	Mahmoud ElGizawy	Schlumberger
Neil Bergstrom	Independent	Scott Farmer	Total
Knut Ness	ADNOC	Hans Dreisig	Total
Kevin McClard	Performance Drilling	Manoj Nair	NOAA
Craig Sim	DGI	Pete Clark	Chevron
Susan Macmillan	BGS		

Revision 5

Revision 5 is now at full release. Since the previous meeting the Set A and Set B generic tool-codes ("OWSG models") have been added to the website. Diagnostics are still not available. Other documentation on the website includes a definition of the various classes of geomagnetic model and a page of archive documentation, including some notes created by Steve Grindrod and Stefan Maus' original presentations supporting the values we use for high and low resolution geomagnetic models.

The new misalignment terms (XYM3E and XYM4E) include a function to limit how much their effect is diluted by high rate surveys. Jerry Codling reported that some users had had problems with this function blowing up for extremely small course lengths.

ACTION: Andy McGregor & Steve Grindrod to resolve difference in diagnostics and publish files.
ACTION: Andy McGregor & Jerry Codling to liaise to resolve the misalignment short course length problem.

Generic Models – Set E

The set of tool-codes we inherited from the OWSG included their Set E of experimental tool-codes. This includes MWD+HRGM+MS models, several dual inclination models and some assumed vertical models. After discussion it was agreed that the MWD+HRGM models should be moved to Set B, but that we should not publish the other models on the ISCWSA website. Dual inc models are the province of the service provider, since tool magnitudes depend on the exact nature of their service and QC

process. Assumed vertical models are very much field and technology dependant and should not be considered part of a generic set of models.

ACTION: Steve Grindrod to move HRGM models to Set B

Open Source Error Model Implementation

Jonny Corcutt has published an open source Python implementation of the Rev5 MWD model at https://pypi.org/project/welleng/

Side-track Errors

Harry Wilson gave an update on the work of the side-track group. They are trying to recommend best practise for handling survey errors in side-tracks so that software applications can implement a consistent process.

The group has met three times and:

1) Defined some conceptual geometry test cases to be used later to validate software.
2) Decided that the relative uncertainty method described in SPE 67616 and used for geomagnetic correlations also applies in side-tracks.
3) Reviewed an alternative matrix-based approach to handling summation and correlation of the survey errors. This gives the same results as the method outlined in SPE 67616 but is conceptually easier to code. It will be written up and added to the definition document as an alternative approach.
4) Reviewed the depth model sources and propagation modes and decided that they are appropriate and conservative for use for side-track correlations, with the exception that they believe that a systematic, wireline stretch term is required. DSTW-S. This is required so that wireline stretch is not handled as though it is correlated with the current drill-pipe global stretch term.

Work continues with a view to produce a recommended practices document and numerical test cases.

ACTION: Side-track working group to report back.
ACTION Jon Bang & Erik Nyrnes to write up the matrix summation method.
Lead- Harry Wilson, also Andy McGregor, Erik Nyrnes, Jerry Codling and Darren Aklestad.

Breaking Models Into Component Blocks

To simplify maintenance of the generic models and to allow us to add further axial interference options would the number of models becoming unmanageable it is desirable to break the models into their component parts. There is a clear route to doing this, at least with the MWD models.

Andy McGregor presented some slides prepared by Steve Grindrod which showed how Steve handled this in his software.

This led to a discussion and several observations:
This method would also allow software to create models on the fly.
It would be desirable, that as much as possible gyro models are included in a similar methodology.

End users need clear information to identify what goes into a model an to select the correct model for their situation.

Reference numbers/IDs for models was preferred.

Axial interference models should have the actual magnitude in the model name.

A method needs to be devised for sharing models between applications.

How to handle dynamically varying magnitudes in this framework.

ACTION: A working group was created comprising Andy McGregor, Steve Grindrod, Adrian Ledroz, Craig Sim, Darren Aklestad, Jonathan Lightfoot, Jerry Codling