Modelling Update – 5/9/12

Meshing Issues…

- Visited Mike C last Thursday to try and resolve problems with the model and discuss various aspects of the work.

- After going through the model there were clearly some not obvious issues with the model so Mike contacted VF to ask them to take a look asap.

- VF got back that day and reported that there were a number of subtle issues that were preventing reliable meshing, we hope that these have now been resolved – at least if there are issues the software actually shows me where they are instead of just hanging!

- Still occasionally getting some meshing errors but I'm currently finding that these can mostly be resolved by adding additional cuts and tweaking the meshing resolution.

Where are we now (1)

- As a result of these changes we now have a completed model with the following geometry and no known issues

  - South Shield Wall
  - North Shield Wall
  - Virostek Plates
  - Solenoids in Step IV solenoid mode
  - Beam Dump
  - Hall Walls

- I have a completed model with these objects but I haven't yet had a look at the output file (tbh at this stage just the knowledge that the model completes successfully is good enough as the output is probably of limited value)

Where are we now (2)

- Yesterday I chose to get the floor web (steel structure) into the model.

- I chose this over the quads as I knew the floor web would interfere with the shield walls and I wanted to see how easily I could integrate this without 'breaking' the model… I suspect there will be several occasions where adding geometry will cause this kind of problem so I wanted to try and tackle an example of this now.

- Took some effort but in the end I managed it – the method is a bit brute force insomuch as I have ended up with many cut planes and small volumes in the North Shield Wall but it meshes ok and without errors – I may need to revisit this if we have to add more detail into this area.

- So I currently have a model solving containing:

  - South Shield Wall
  - North Shield Wall
  - Virostek Plates
  - Solenoids in Step IV solenoid mode
  - Floor Web
  - Beam Dump
  - Hall Walls

  Should know by later today/tomorrow whether this model solves ok

West Wall

South Shield Wall

North Shield Wall

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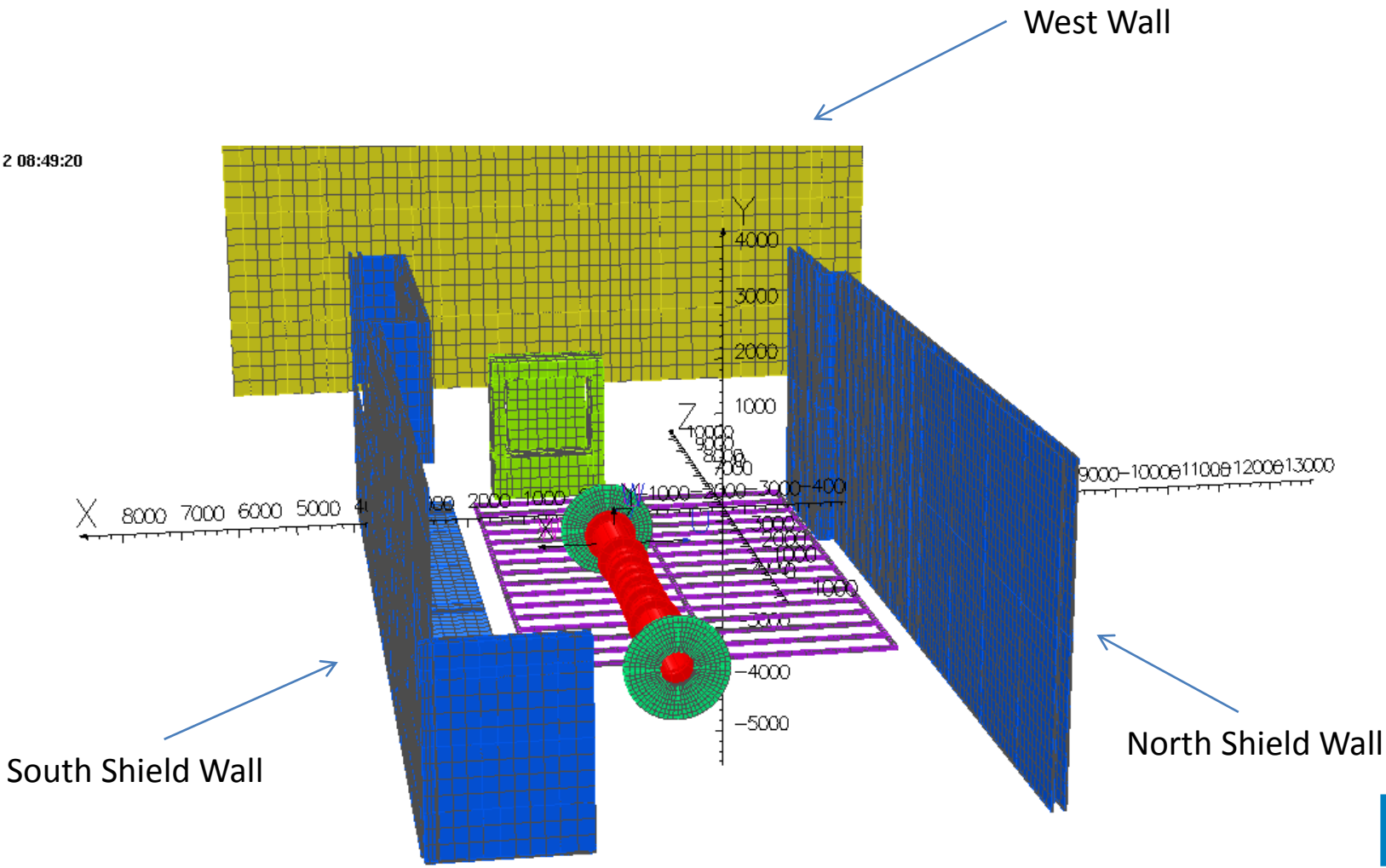
Goals for this week…

Primary…

- To get the quads and D2 meshed and into the model
- To tidy up the existing model and take another look at the meshing resolutions. Try to formalise what I already have.

- To find more modelling problems that we need external help with – good for morale!

Secondary

- To continue getting other iron into the model from Luke's list.

I think we are going to be in this modelling phase for a few more weeks yet before having something that is generically useful.

Current Direction/Comments

The model I'm building has more detail than previous models. That detail is coming at price...

It's already taking 18 hours to run a model and this will get worse as I add more geometry.

The improved detail requires finer meshing resolution so this is unavoidable to some extent.

Speaking with Mike last week the current role of the model is to

- Improve model geometry over existing models

- To use the model as a comparison with existing models, they should all agree to within the resolution of the detail. The ability to switch components in and out of this model should be useful in making these comparisons.

Given the size of the model and the time it takes to run it there will come a point where it will be worth doing some testing to see what components affect the field in localised areas.

For example do the quads significantly affect the field seen at the West wall? It's unlikely that they do so if we can demonstrate this then we could switch these out of the model if we were interested in looking at localised effects in this West Wall region... etc. This will help speed things up when we start using the model.

Current Direction/Comments

Mike C – commented to me last week:

There may come a point where we would like to pull out the field in a localised area that has been generated by the Hall model and then use that field in a component model – IF THIS IS POSSIBLE this may speed up the computation time and allow more modelling to be done.

Requires some thought as it would be necessary to demonstrate the localised field would not be significantly altered by the placement of said components in any model…

Would allow others to build independent models that would take the localised field from the Hall model.

Contacted Chris Rogers about setting up a repository and we will do this using bazaar on Launchpad. Not yet implemented but on the action list.