

AGS Online Model

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The Need

Model parameters now used in AGS applications are:

- Distributed: each application has its own piece (with no notification of changes in one application to another)
- Static: Optics parameters are changed only very rarely (never, once a run)
 - Largely based on a ‘pleasant’ superperiod symmetric lattice, not true of the polarized proton lattice, esp. near injection.

e.g. The same Twiss parameters are used for a bump in a bare machine as in a snake’d one.

The Goals

- (AGS) APEX *gives*
 - Model improvements
 - Ramp tunes/chroms
 - ORM (lots and lots)
 - Bare
 - Bare+quads
 - Bare+quads+sext
 - Snakes of every temperature
- APEX (and the physics program) *get*
 - An easier model interface
 - Fast model vs. measurement comparison
 - Improved orbit/tune control

‘Closing the loop’

The Plan

An AGS Online Model consists of two parts:

AGS Ramp Manager

John Morris

- Monitors machine for changes to 'live' functions included in model
- Notifies Model Server of the changes
- No control functions.

AGS Model Server (CDEV)

Seth Nemesure

- Listens for change notifications from AgsRampManager
- Converts 'live' functions to input format of model engine (MAD-X to start) (Schoefer)
- Runs model
- Holds resulting optics data for delivery to client apps.

Some Nitty Gritty

- (Naively) Calculating model at ~ 30 well-chosen times between injection and end of flattop gives sufficient resolution.
 - 'well-chosen' = injection, B-dot, transition, spin resonances, extraction
- With MAD-X : 30 points takes ~ 30 seconds.
 - Sufficiently fast for studies/model verifications
 - Not fast enough to keep up with every change to AGS functions.

To start, model calculations will probably occur on demand from a user.

More sophisticated rules for when changes to the machine are 'large enough' to merit recalculation can be developed.

Note to operations: Model parameters will not be provided to applications without an explicit request from the user. 'Revert to good old tried and true' buttons would be available (and big).

Three Customers

1. agsIpm: a test bed. Already uses early command line driven 'online' model data. Data useful immediately for studies/model debugging.
2. AgsTuneMeter: quickly display modeled tunes with the measured tunes up the ramp.
3. AgsOrbitControl: very useful for model verification (e.g. testing 3-bump closure). Can build bumps for studies based on online model Twiss parameters without interfering with 'operational' orbit bumps.

AgsRampViewer

- Interface based on RampDesigner
- Quick viewing of model outputs for live or archived AGS setups.
- Could eventually be used for offline modeling (“what if?” scenarios).

Summary

- Driven largely by:
 - A need to speed up the experiment->model correction->experiment loop.
 - The gross distortions/tight control requirements introduced by the polarized proton lattice.
- Plans For FY08
 - Commissioning AgsRampManager and AgsModelServer
 - Live model data into agsIpm, AgsTuneMeter, AgsOrbitControl (?)
 - AgsRampViewer