Recent MAD-X Issues (Update)

Consolidation Phase in View of LHC Commissioning

- BV kill initiative (SF, JLN,TR, FS) ➔ report next LCU
- Sort out aperture types ➔ Yipeng Sun (FS PTC) ←
- Finalize thin lens tracking model (several bugs and wrong 6D closed orbit) YS
- Work on aperture model (IA, HG, JBJ, TR)
- Catastrophic Failures of Twiss for CLIC (SF, HG, *JBJ*, FS) ←
- PTC_TWISS upgrade (JLN) ←
- PTC standalone model of LHC (May 2009 JLN, FS)
- BB in PTC (help inside and outside of CERN)
- ***Important:*** Missing keywords are now considered a fatal error to avoid misleading or wrong (time consuming to find!) results from MAD-X!
- Help from module keepers needed for MAD-X examples! ← ←

Catastrophic Failures of Twiss for CLIC!

1. Threader was deactivated for lines and for good reason! Once HG reactivated it many side-effects became apparent that needed 2 code iterations to be solved. Documentation will be released (HG, JBJ, TR, FS).
2. In particular, various parameters were not properly initialized for lines. This will need one more iteration at least.
3. It was never noticed, up to now, that the T variable (cT to be precise) was always forced to be closed (SF, HG, JBJ, FS).
4. As expected dispersion is well calculated but NOT for at a non-zero dp/p. Moreover, the derivative of dispersion is wrong by a factor of 2 for some magnet types but not for all! (bends bad, quads ok!)
5. The derivative of dispersion as calculated by Twiss (ddx etc) is always wrong by a factor of 2. No explanation yet.
6. In presence of coupling the tune versus dp/p seems ok, however the chromaticity from Twiss is wrong! (LHC + a1 ➔ wrong by 20%)
7. Fortunately all results are just fine from PTC! This MUST be like that by design, i.e. all wrong or all right but always consistent!
8. Effort for MAD-X remains relevant since PTC_TWISS (again by design!) must be slower (order of 5).

PTC_TWISS Upgrade

- PTC_TWISS works since years reliably and at CERN is used more and more (transfer lines, PS, …)
- Despite various features not all Twiss “decorations” have been provided for the PTC version.
- Jean-Luc has taken over responsibility for this module and presently the following missing features are being added:
  - Twiss parameters within a magnet
  - Dependence of the Twiss parameters on dp/p
  - Full summary table as known from standard Twiss
  - Momentum compaction to higher orders
  - Remark: Standard plotting works on PTC attributes like beta11 etc
- In passing I should mention that Jean-Luc has provided the sector map TFS output for the standard Twiss.

Automatic Example Testing

1. The example testing is absolutely essential as a sanity check for MAD-X!
2. We have found well hidden bugs that have been in the code for years!
3. This testing has revealed just yesterday that people have been using non-existing attributes like T1 as used in MAD8 (now stopped as fatal).
4. So it is required that every module keepers keeps an eye on their respective module when alarmed by the automatic notification.
5. We are aware that occasionally too many pseudo errors are “detected” but if the module keepers have a quick look this will not be a big effort, albeit real bugs must be fixed!
6. JLN and myself CANNOT go continuously through all examples which is a time consuming job indeed!
7. When we hear nothing from the module keeper we leave all as is and the module keeper remains responsible for the correctness of the examples.
8. Once corrected we will reset the example reference to this latest and corrected version.
9. For the time being one has to get the examples from CVS for testing and we commit back changes. Later we will allow all users to control their examples.
10. Due to the recent hectic MAD-X development phase some nasty errors slipped through and some users lost time (our apologies!). We will therefore modify the procedure as follows:

    - For each new version we will create MAD-X versions with a “_devel” ending
    - This version will have the latest developments but at the risk of some new bugs
    - A production version will be released after the full example suite has been tested (2-3 days of number crunching!) and all known bugs being fixed