Outline

• Coupling in MAD-X
• The WIRE
• TILT + misalignments
Coupling MAD-X

• An estimate of the $|C-|$ has been implemented
  • Very nice presentation from Eirik in the ABP-group meeting
    • If you haven’t seen in check, it out for the background on the estimate and how to use it!
    • /afs/cern.ch/user/m/mad/madx/releases/pre-rel/madxCouplingEst

• Since, then we have also added a warning with in how many of the elements the $|f1010| > |f1001|$, since this means that the estimate might be inaccurate

• Also added a phase of the DQMIN in the summary table
  • Note this is not the same phase as the LHC coupling knobs!
  • The phase is the DQMIN in the beginning/end of the lattice
    • However, gives you the possibility to match to the same DQMIN but with a different phase.
The WIRE

- The WIRE has been implemented in MAD-X (not PTC)
  - Available in TWISS and in TRACK
  - It is based on the same map as in SixTrack (think kick)
  - The matrix and second obtained through differentiation
  - Uses the same logic as the beam-beam element in MAD-X ->
    - Option, bborbit = true; -> Kick the beam on the closed orbit

- Tests so far:
  - The orbit impact is the same as in SixTrack
  - It is symplectic
  - Sent it to Guido and Riccardo for testing. If you are interested to test it let me know
How to use it?

• Either the WIRE element can be used:
  • wi : wire,  l=1,  xma={0.002,0.003}, yma={0.001,0.004}, current={1000,1500}, l_int={1,2}, l_phy={1,2};

• Can also be defined as a collimator:
  • Co_wi : collimator,  l=1,  xma={0.002,0.003}, yma={0.001,0.004}, current={1000,1500}, l_int={1,2}, l_phy={1,2};

• No difference in the physics when used in MAD-X
  • When sliced the COLLIMATOR becomes a wire and collimator

• A length is allowed in TWISS, and a drift is simply added on each side
Misalignment + tilt

• In the previous MAD-X version the order of misalignment and tilt was swapped between PTC and MAD-X
  • The way it was in PTC was not consistent with the description of TILT in the manual being something that belong to the element.

• However, still an issue with misalignment + tilt for BENDS in PTC
  • Works fine in MAD-X
  • Causing issues for ADAM
  • Investigation ongoing (Piotr is also helping)
Some “interesting” observations while trying to find the reason (no tilt even)
• We have a bend with a bending angle of $\pi/2$.
• We are only looking in the horizontal plane now.
• A particle with $x=px=0$, will end up where?
The next particle: $x = 0.001$, will end up where?
A particle with: $x = 0.001$ and a misalignment of $dx=0.001$ will end up where?
Summary

• Coupling estimate has been implemented in MAD-X.
  • Please give it a go if you are interested!

• The WIRE is implemented and under review

• Still an issue to understand with tilt + misalignments in PTC for bends
  • It is linked to the change of the reference frame
  • Can give an update when we have more information about this