

Follow-up of ACCSIM-ORBIT benchmark

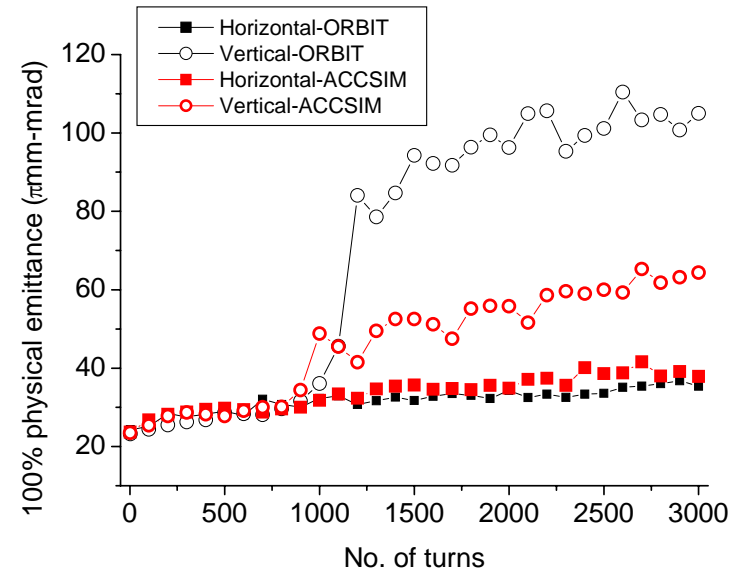
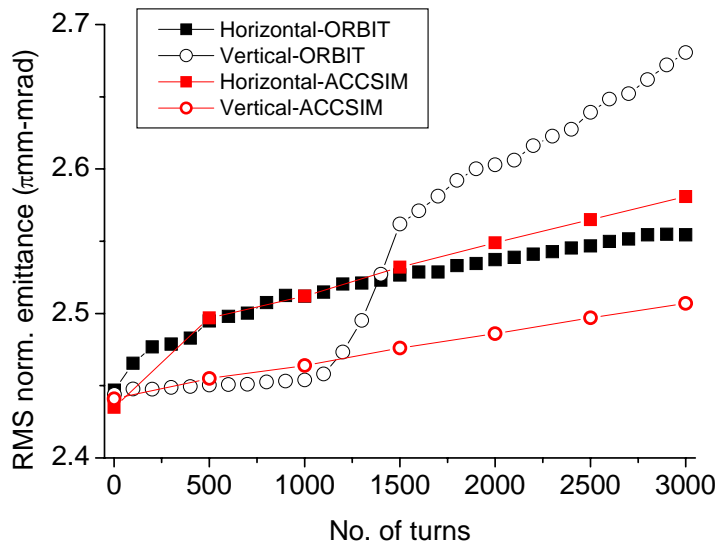
LIS meeting, 14/May/2007

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Issues of comparison

- For LHC nominal beam (160MeV, $3.25 \cdot 10^{12}$ protons), vertical motion showed disagreement



- Check tracking model in ORBIT and ACCSIM
 - Nonlinear or linear tracking

Tracking model in ORBIT

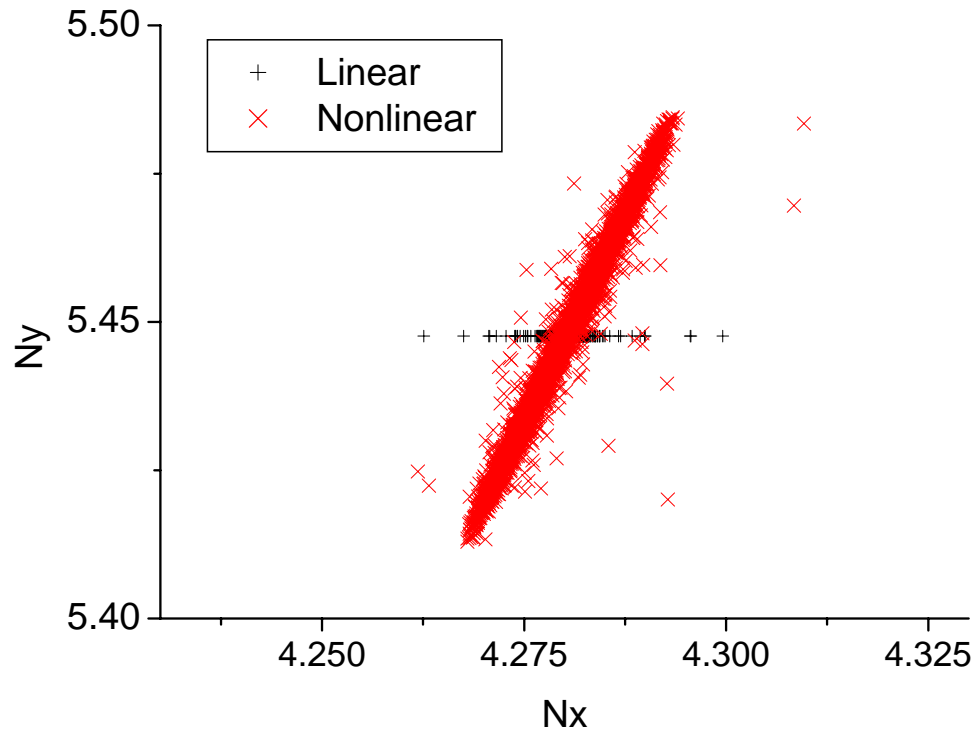
	Linear	Nonlinear
Linear elem.	Yes	Yes
Nonlinear elem.	No	Yes
Fringe field	Linear	Nonlinear
Chromaticity	No	Yes
Dispersion	Yes	Yes

Note that nonlinear tracking is not documented in ORBIT manual (V1.10)

ACCSIM uses linear tracking

Tune spread (ORBIT)

- Tune spread without space charge with dP/P

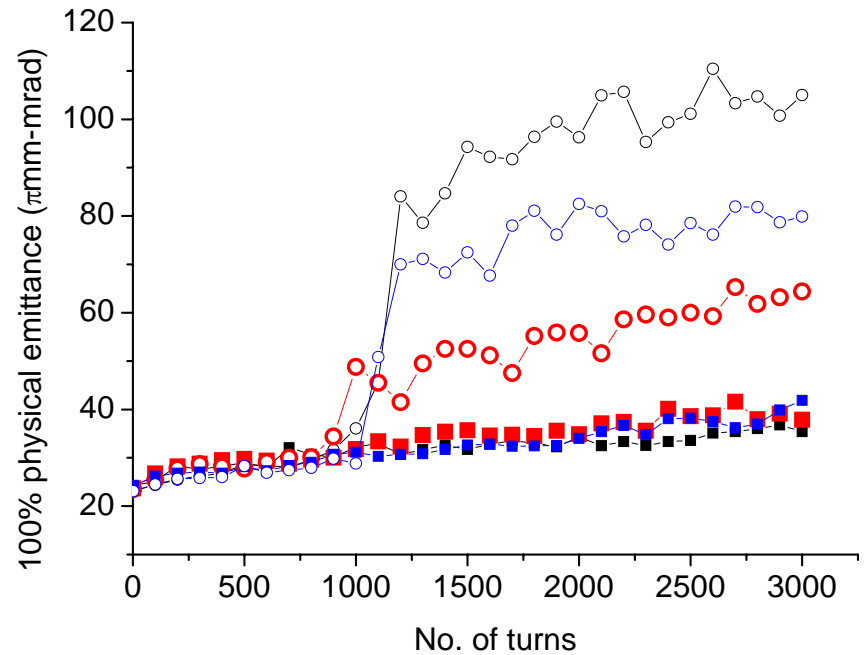
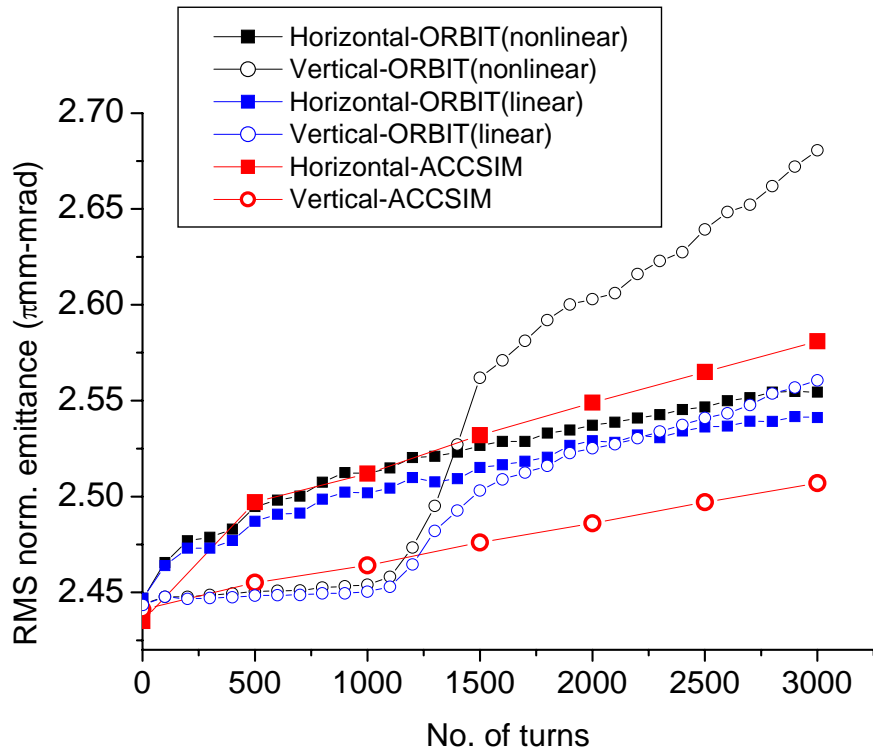


$$dQ_x * dP/P = 3.65 * 0.34\% = \pm 0.0124$$

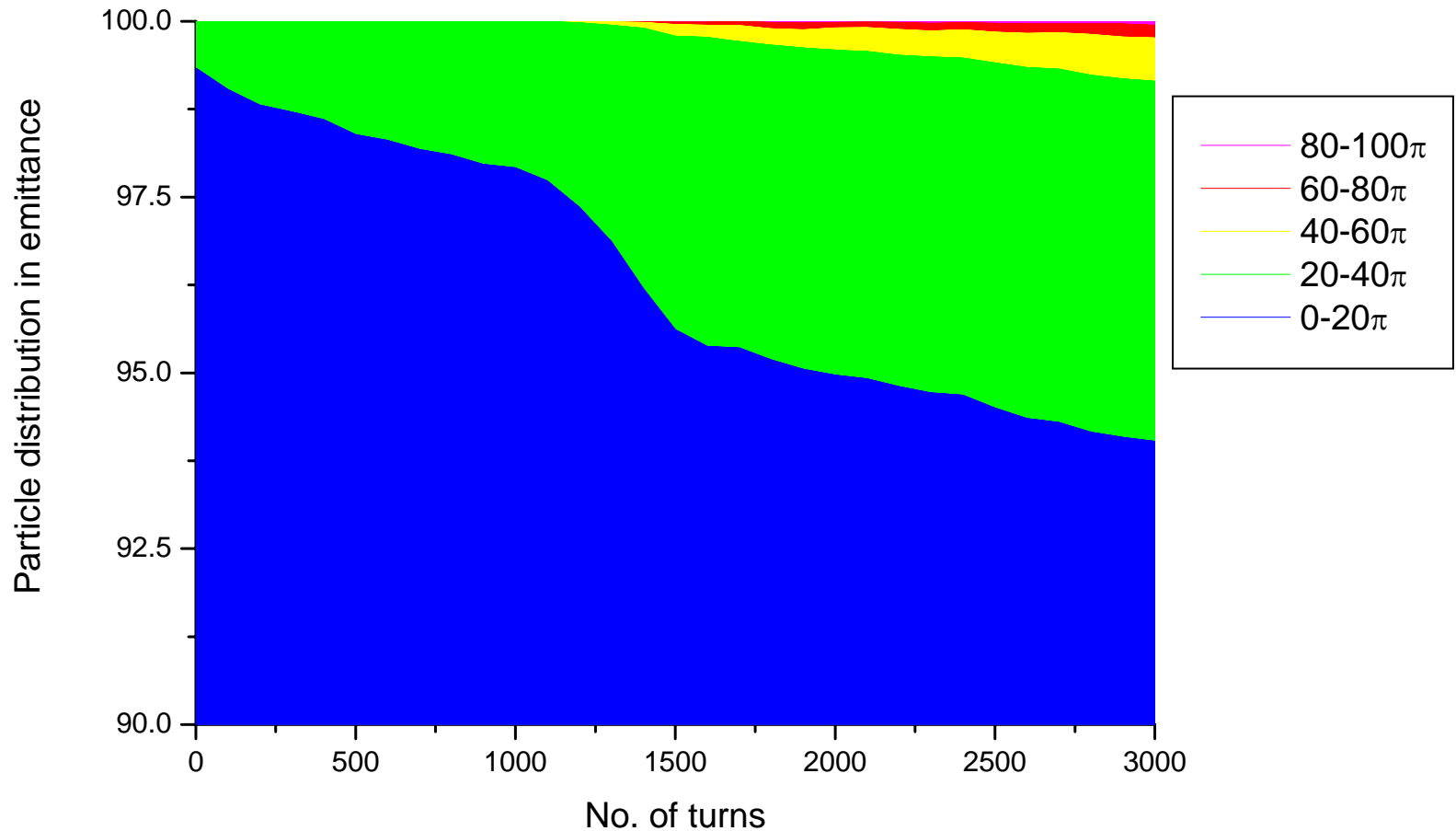
$$dQ_y * dP/P = 10.3 * 0.34\% = \pm 0.035$$

Chromatic tune shift is consistent to analytical one
Tune spread in ACCSIM is similar to that of linear tracking

Emittance evolutions



Particle distribution in emittance



Number of halo particles ($>40\pi$ mm-mrad) is about 1%.

Remarks

- Benchmarking of ACCSIM and ORBIT for LHC nominal beam
 - With linear tracking, emittance evolutions in ACCSIM and ORBIT are not so different
 - ~1% halo particles are observed at 3000 turn