Dispersion and COD, 30/5/14

D. Kelliher

Dispersion variation

- Is the measured variation in distortion caused by a dipole kick?

12.5.1 Self Compensation of Perturbations

The linear superposition of individual dipole contributions to the dispersion function can be used in a constructive way. Any contribution to the dispersion function by a short magnet can be eliminated again by a similar magnet located 180° in betatron phase downstream from the first magnet. If the betatron function at the location of both magnets is the same, the magnet strengths are the same too. For quantitative evaluation we assume two dipole errors introducing a beam deflection by the angles θ_1 and θ_2 at locations with betatron functions of β_1 and β_2 and betatron phases ψ_1 and ψ_2, respectively. Since the dispersion function or fractions thereof evolve like a sine-like function, we find for the variation of the dispersion function at a phase $\psi(z) \geq \psi_2$

$$\Delta D(z) = \theta_1 \sqrt{\beta\beta_1} \sin\left[\psi(z) - \psi_1\right] + \theta_2 \sqrt{\beta\,\beta_2} \sin\left[\psi(z) - \psi_2\right]. \qquad (12.117)$$

H. Wiedemann, "Particle Accelerator Physics"

COD and Dispersion (Zgoubi)

- Introduce 4 mrad kick
- COD and dispersion distortion