# Solution to Emittance Exchange?

---Design principles and a possible solution

Chun-xi Wang

Argonne National Laboratory

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# Design principles

- Update good transverse cooling channels
- Maintain periodic structure, beta function
- Create localized dispersion in desired periods — closed dispersion bump
- Keep "rotational symmetry"
- No dispersion in RF
- Dispersion section to be 1st order achromat, and close to isochronous
- Be realistic

# Systems under consideration

Solenoid + dipole + quadrupole + RF + absorber

Goal: theoretical framework and possible solution

[redacted]

[redacted]

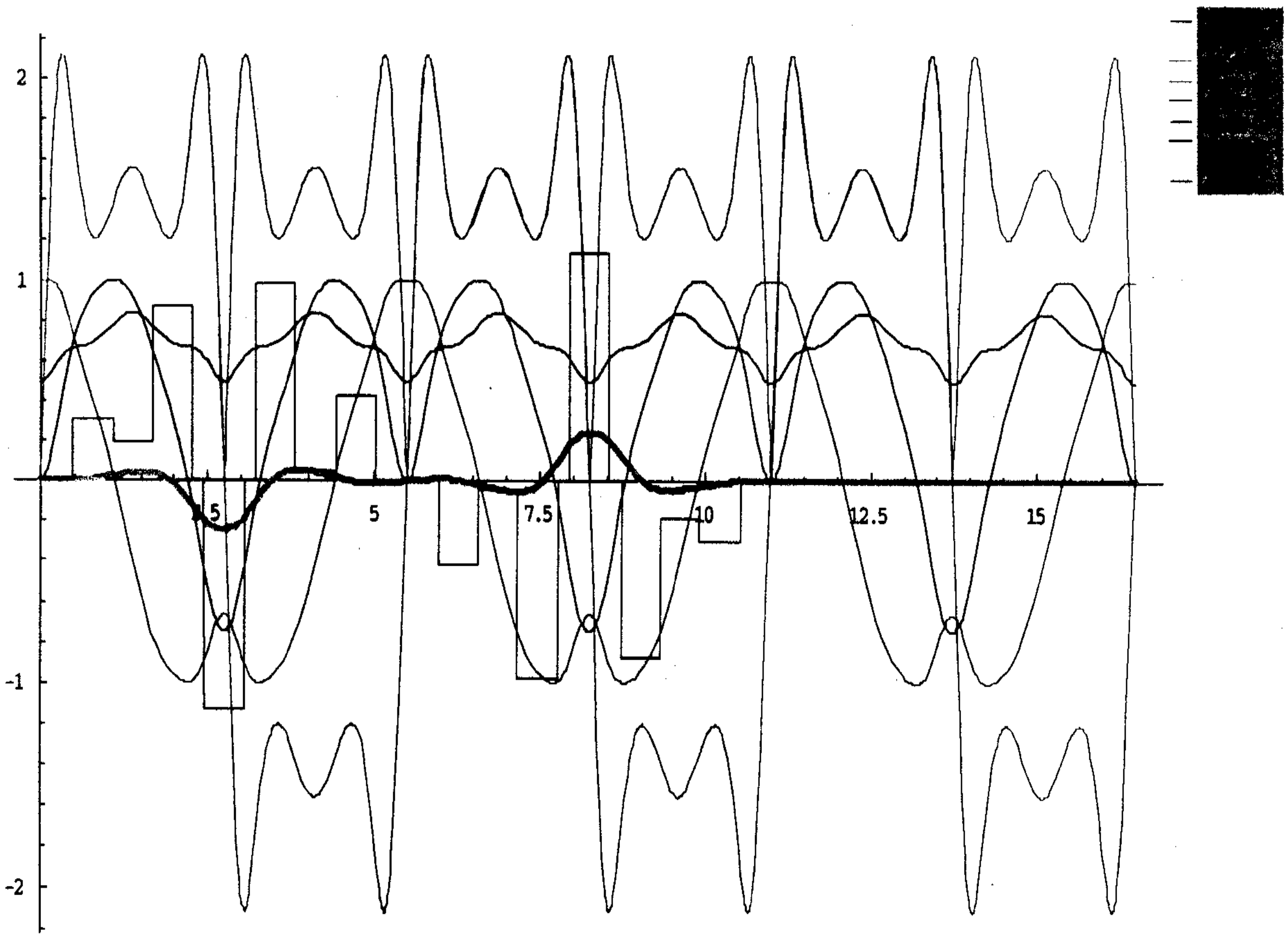
[redacted]

# Equations for dispersion function

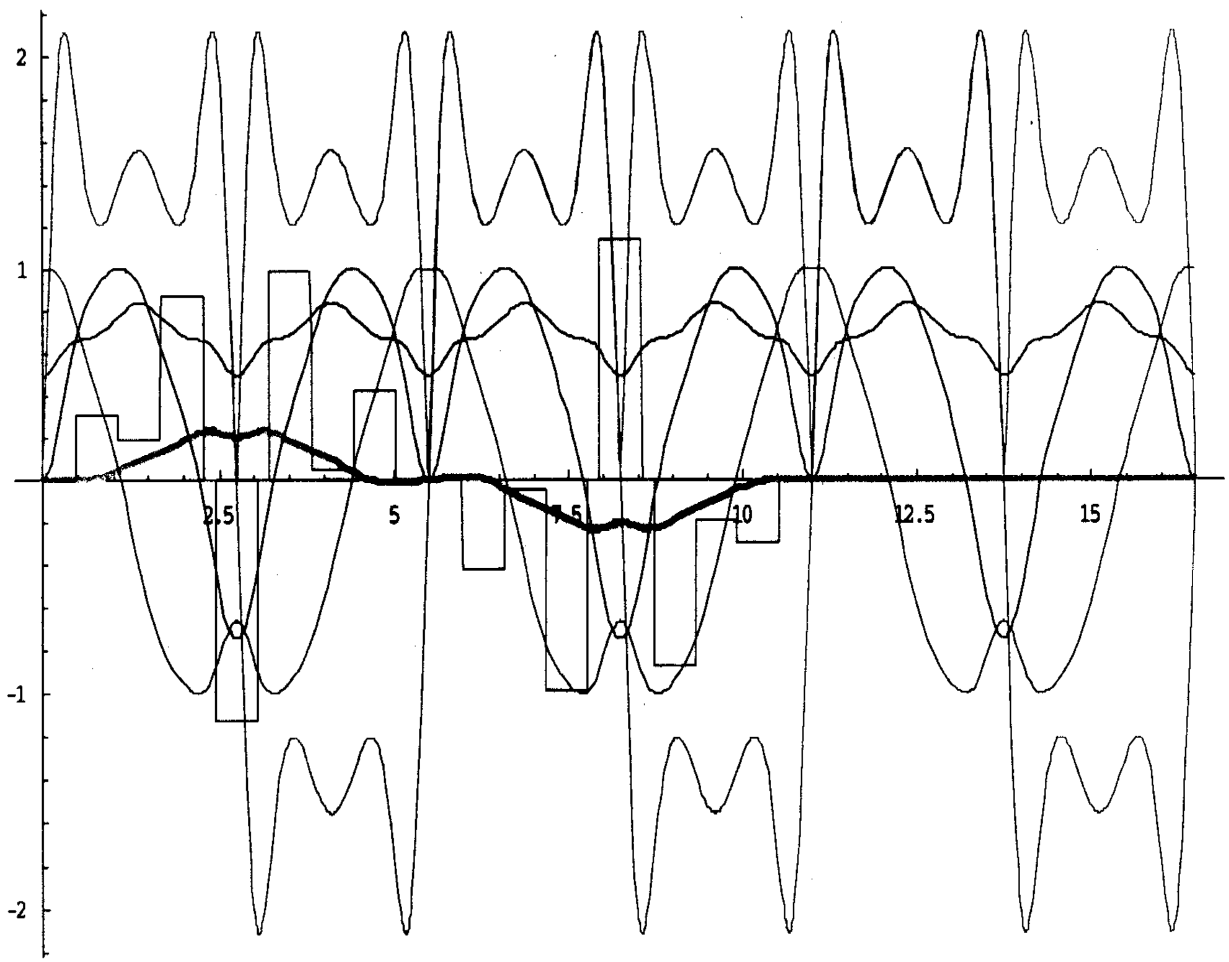
[redacted]

[redacted]

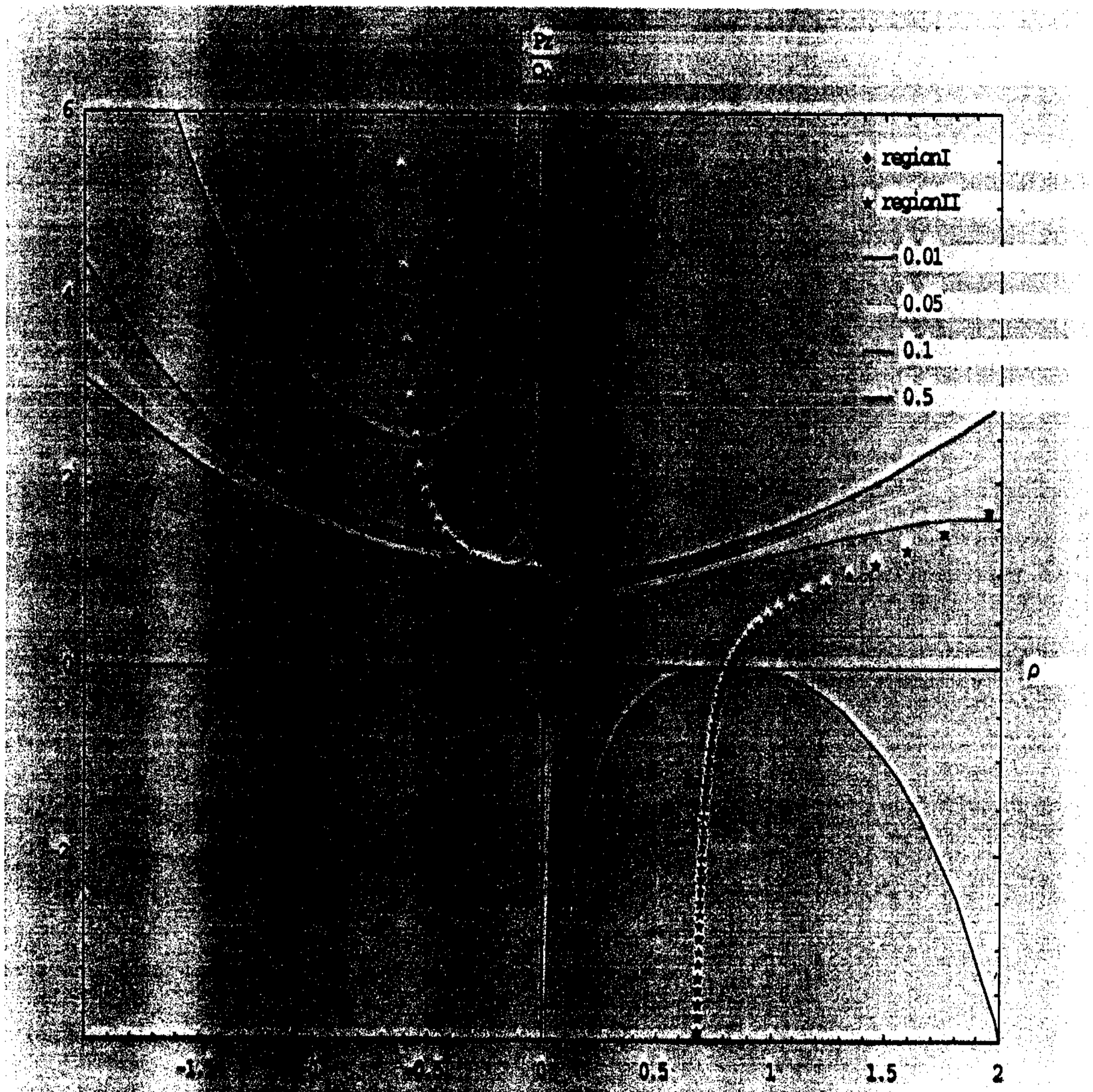
# Example Solution



# Example Solution



# Equilibrium orbit and stable region



# Equations for dispersion function

$$\eta x''[s] + K[s] \text{ [illegible] } = \frac{\text{Cos}[\theta[s]]}{\rho[s]}$$

$$\eta y''[s] + K \text{ [illegible] } = \frac{\text{Sin}[\theta[s]]}{\rho[s]}$$

# Systems under consideration

**Solenoid + dipole + quadrupole + RF + absorber**

Goal: theoretical framework and possible solution

$$\frac{1}{2}\left(px^2+py^2\right)+\frac{1}{2}\kappa[s]^2\left(x^2+y^2\right)+\kappa[s]\,(x\,py-y\,px)-\frac{x\delta}{\rho[s]}+\frac{x^2}{2\rho[s]^2}-\frac{1}{2}k[s]\left(x^2-y^2\right)+\frac{1}{2}\delta^2+\frac{1}{2}v[s]\,z^2$$

$$\frac{1}{2}\left(px^2+py^2\right)+\frac{1}{2}K[s]\left(x^2+y^2\right)-\frac{x\delta\,Cos[\theta[s]]}{\rho[s]}+\frac{y\delta\,Sin[\theta[s]]}{\rho[s]}+\frac{1}{2}\delta^2+\frac{1}{2}v[s]\,z^2$$

$$K[s]=\kappa[s]^2+\frac{1}{2\rho[s]^2}$$