

# Homework Problems VIII

## Accelerator Physics

### 1. Nonlinear Resonance Problem

Using the resonance perturbation theory discussed in the class, describe the behavior around the resonance  $3\nu = n$  for the lattice with sextupole and cubic nonlinearity:

$$H = \delta I + \alpha_0 I^2 + A_n I^{3/2} \cos 3\phi.$$

Consider cases  $\alpha_0 > 0$  and  $\alpha_0 < 0$ . What you can say about the behavior when detuning from resonance  $\delta = 0$ .

(For simplicity assume that  $\delta > 0$  and  $A_n > 0$ ).