**Homework 04**
**(due Friday October 13)**

**Problem 4.1.** (Graded of 30 points.)

(a) Include nonlinear term $\alpha x^3$ into the equation describing the parametric excitation problem discussed in class; find the corresponding addition to the reduced (Van der Pol) equations.

(b) Find the stationary amplitude $a_0$ of parametric oscillations; sketch and discuss the $a_0(\xi)$ dependence.

(c) Find the type and stability of each fixed point of the reduced equations.

(d) Sketch the Poincaré phase plane.