Lyapunov Stability

Lecturer:

- John Leth

In this lecture I will introduce you to the concept of stability, and show you some methods for determining whether or not an equilibrium point is stable or unstable.

For this lecture I urge you to have a look at Ch. 2.1-2.4 (and Ch. 3.1) in [Kha00]. This is not part of the curriculum, however I believe that it will help you to understand the more advanced material presented in this lecture.[1]

Headlines:

- Lyapunov stability:

    Definition of stability.

    Lyapunov's stability theorem.

Literature:[2]

- Ch. 4.1 in [Kha00].

Exercises:

1. 4.3 [(1), (2) and (4)] on page 181 in [Kha00]. Do not investigate for globally asymptotically stability.

2. 4.6 on page 182 in [Kha00]. Hint; try $g(x) = (ax_1 + bx_2, cx_1 + dx_2)$.

3. 4.16 on page 184 in [Kha00], BUT you only have to show stability. Hint; adjust (on a, b, u, v) the map $V(x) = ax_1^u + bx_2^v$ to produce a Lyapunov function.

---

[1][Kha00, Ch 2.1-2.4]=[Kha15, Ch 2.1-2.4], [Kha00, Ch 3.1]=[Kha15, Ch 1.1]
[2][Kha00, Ch 4.1]=[Kha15, p. 49-50, Ch 3.3]