Friedrich-Alexander-Universität
Technische Fakultät

Modeling of nonlinear systems with LSTMs

Sebastian Hirt | 20.10.2022
Lehrstuhl für Regelungstechnik

Problem description

Problem description

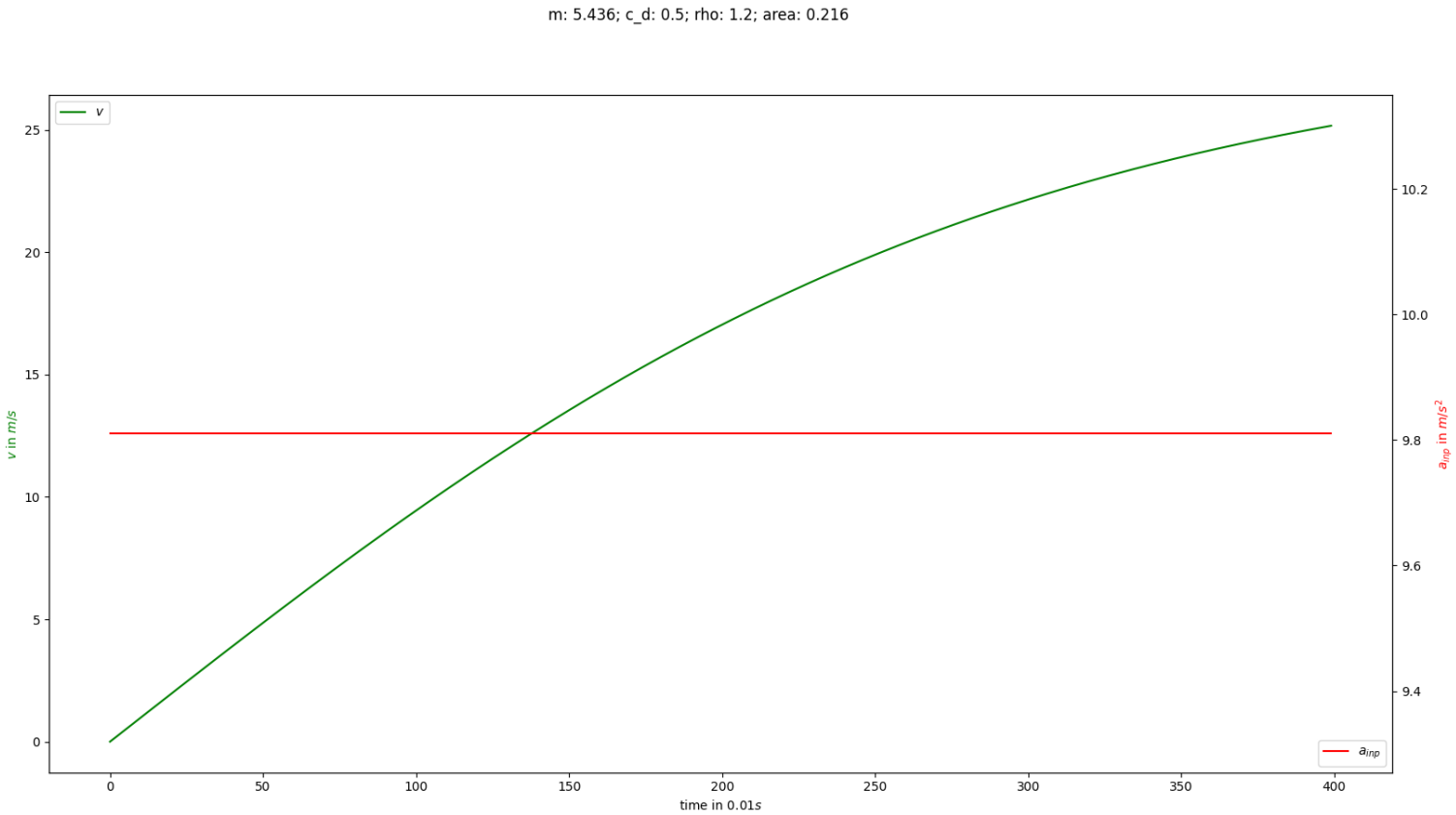
- Pushing force:
  - $F_p = ma$
- Air resistance (Drag):
  - $F_d = \frac{1}{2}\rho v^2 C_D A$
- Simplification:
  - $b = \frac{1}{2}\rho C_D A$
- Resulting force:
  - $F = F_p - F_d$

Problem description

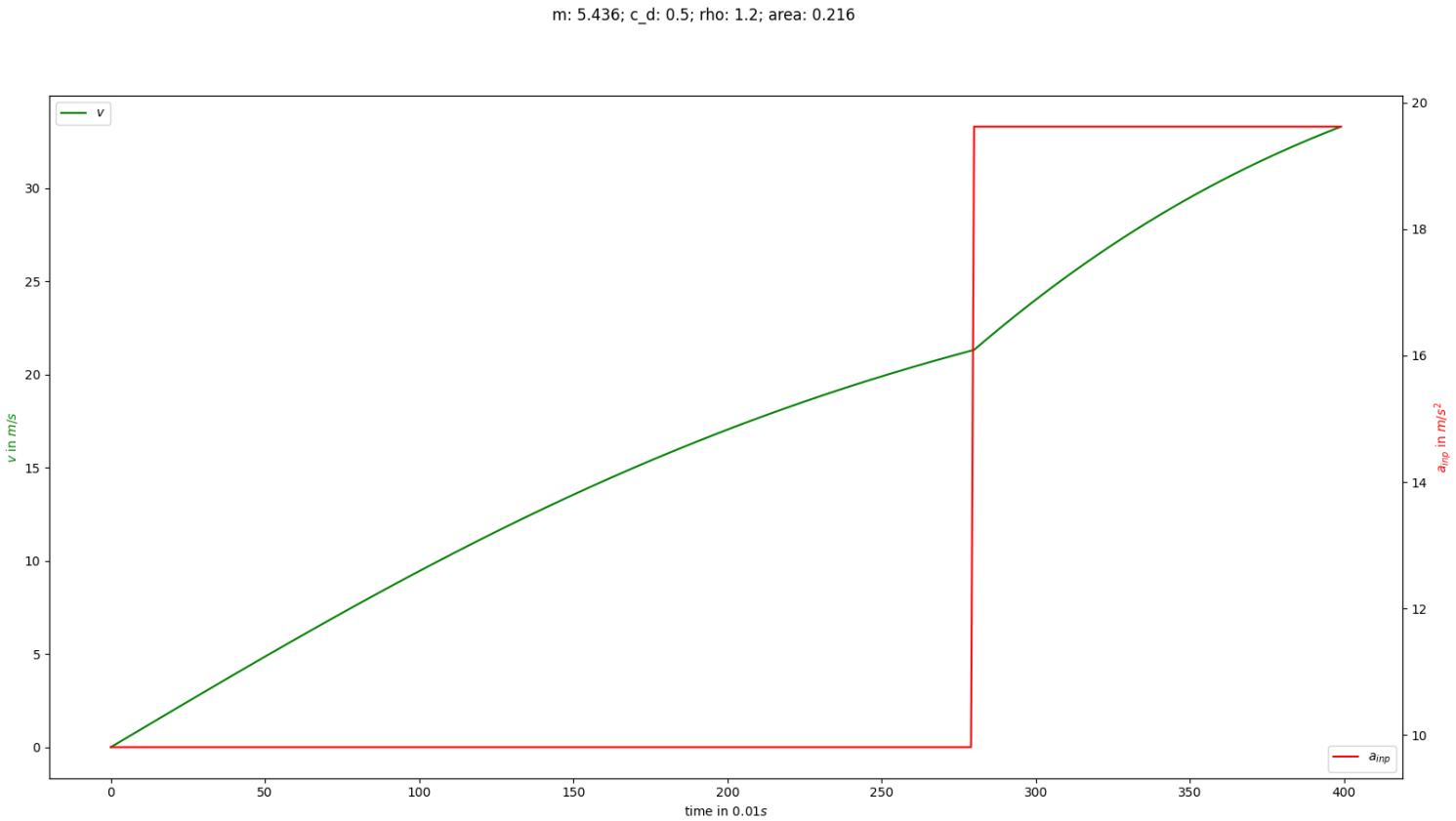
- Resulting force:
  - $F = F_p - F_d$
- Express as second order differential equation:
  - $m\frac{d^2x}{dt^2} = ma - b\frac{dx}{dt}$
- Transform into system of two first order equations:
  - $\frac{dx}{dt} = v$
  - $\frac{dv}{dt} = a - \frac{b}{m}v^2$
  - → use in odeint python function to get values of velocity and/or position

Visualization

Visualization



Visualization



Data Samples

Vielen Dank
für Ihre Aufmerksamkeit!