

# The Furuta Pendulum

## Technical Report

Maximilian Gehrke · Tabea Wilke ·  
Yannik Frisch

Received: date / Accepted: date

**Abstract** The Furuta Pendulum is an example of a complex non-linear system and therefore of big interest in control system theory. It consists of one controllable arm rotating in the horizontal plane and one pendulum uncontrollably moving in the vertical plane, which is attached to the end of this arm.

The non-linearities result from an interplay between gravitational, Coriolis and centripetal forces.

XX We present an overview over it's technical details and proposed algorithms to solve the control problem. XX

**Keywords** First keyword · Second keyword · More

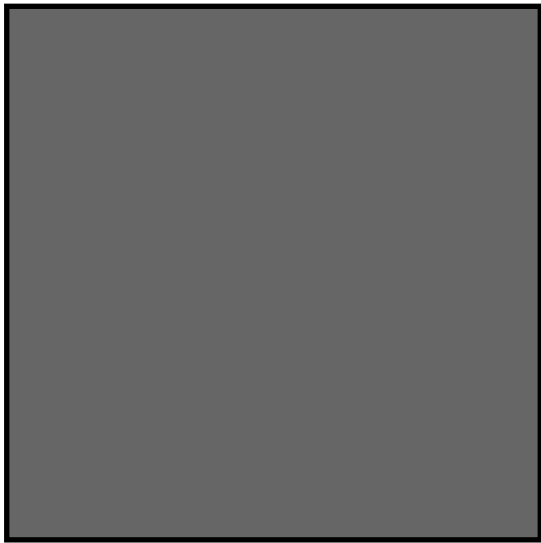
## 1 Definitions

The system consists of an arm with lenght  $L_1$  mounted to a DC motor, which is able to apply a torque of  $\tau_1$  to it. It has a mass of  $m_1$  which is located at  $l_1$  alongside the arm. Another arm with length  $L_2$  and mass  $m_2$  located at  $l_2$  along itself is attached to the remaining side of the first arm. Both arms have inertia tensors  $J_1$  and  $J_2$  respectively and each rotational joint is damped viscously with damping coefficients  $b_1$  and  $b_2$ , where the first coefficient is given by the bearings of the motor and the second one by the coupling between both arms.

---

F. Author  
first address  
Tel.: +123-45-678910  
Fax: +123-45-678910  
E-mail: fauthor@example.com

S. Author  
second address



**Fig. 1** Please write your figure caption here

**Table 1** Please write your table caption here

first	second	third
number	number	number
number	number	number

## 2 Introduction

Your text comes here. Separate text sections with

## 3 Section title

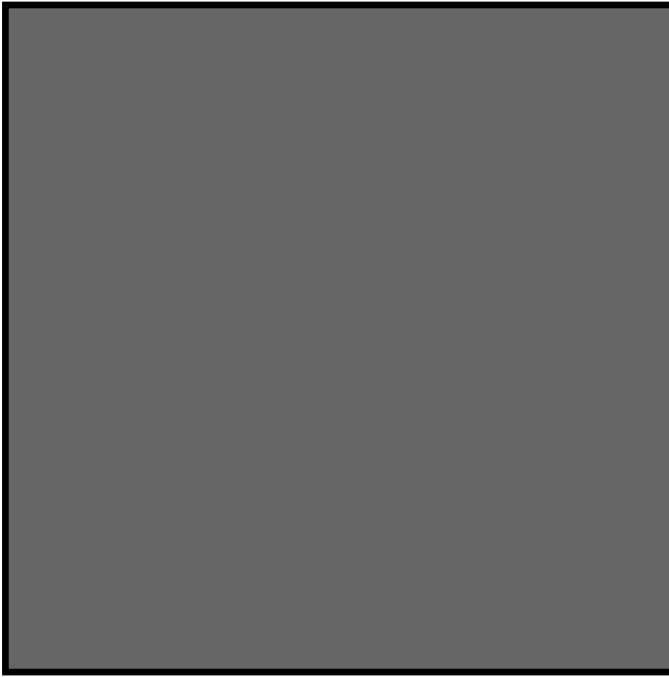
Text with citations [?] and [?].

### 3.1 Subsection title

as required. Don't forget to give each section and subsection a unique label (see Sect. ??).

*Paragraph headings* Use paragraph headings as needed.

$$a^2 + b^2 = c^2 \tag{1}$$



**Fig. 2** Please write your figure caption here

## References

1. Author, Article title, Journal, Volume, page numbers (year)
2. Author, Book title, page numbers. Publisher, place (year)