

## FREIE UNIVERSITÄT BERLIN

Fachbereich Mathematik und Informatik

Promotionsbüro, Arnimallee 14, 14195 Berlin

## DISPUTATION

**Dienstag, 05.09.2023, 10:00 Uhr**

**Ort: Seminarraum 2006**

(Zuse Institut Berlin, Takustr. 7, 14195 Berlin)

**Disputation über die Doktorarbeit von**

**Herrn Siva Prasad Chakri Dhanakoti**

**Thema der Dissertation:**

**Study of Intrinsically Curved Elastic Rods Under External Loads  
with Applications to Concentric Tube Continuum Robots and their  
Control**

**Thema der Disputation:**

**Port-Hamiltonian Systems and Their Control**

Die Arbeit wurde unter der Betreuung von **Prof. Dr. C. Schütte** durchgeführt.

**Abstract:** Over the last two decades, the Port-Hamiltonian framework has drawn greater attention from a wide variety of physical domains. This framework [1, 2] provides a network-based description of physical systems, where the constituent subsystems interact among themselves and with the external environment through energy-conserving ports. This approach is well suited for analysis, control, and simulation of complex systems spanning diverse physical fields such as electrical, mechanical, hydraulic, or thermal, etc.. Another significant aspect of these systems is their modularity, allowing each subsystem to be modeled independently and subsequently interconnected with others. In this talk, I will give a basic description of the Port-Hamiltonian systems commencing with network-based modeling. Later, I will present some control aspects of the Port-Hamiltonian systems [3, 4] using examples.

**References:**

[1] Arjan Van Der Schaft. Port-hamiltonian systems: an introductory survey.

In Proceedings of the international congress of mathematicians, volume 3, pages 1339–1365. Marta Sanz-Sole, Javier Soria, Juan Luis Verona, Joan Verdura, Madrid, Spain, 2006.

[2] Vincent Duindam, Alessandro Macchelli, Stefano Stramigioli, and Herman Bruyninckx. Modeling and Control of Complex Physical Systems: The port-hamiltonian approach. Springer, 2009.

[3] Volker Mehrmann and Benjamin Unger. Control of port-hamiltonian differential-algebraic systems and applications. Acta Numerica, 32:395–515, 2023.

[4] Romeo Ortega, Arjan van der Schaft, Bernhard Maschke, and Gerardo Escobar. Interconnection and damping assignment passivity-based control of port-controlled hamiltonian systems. Autom., 38:585–596, 2002.

Die Disputation besteht aus dem o. g. Vortrag, danach der Vorstellung der Dissertation einschließlich jeweils anschließenden Aussprachen.

**Interessierte werden hiermit herzlich eingeladen**

Der Vorsitzende der Promotionskommission  
Prof. Dr. C. Schütte