ALPEN-ADRIA UNIVERSITÄT KLAGENFURT

Invitation to the Doctoral Seminar

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"A Cournot–Nash model for a coupled hydrogen and electricity market"

N.2.35 | Wednesday, 2 October 2024 | 2:00 p.m.

Abstract

Green hydrogen is hydrogen that has been produced through a chemical process known as electrolysis using renewable energy, only. It has the potential to transform energy systems since it can be stored and transported in gas form, providing a clean alternative to natural gas. However, as an energy source, hydrogen is still in its nascent stage of development and many practical questions remain. In this talk, we focus on how an intraday market using green hydrogen as a storage mechanism can be modeled mathematically. We start with a model developed for natural gas markets and describe how the physics of gas transport change when using hydrogen gas. We describe how game theory can provide solution concepts that describe market behavior for a group of noncooperative wholesalers. One central difficulty when modeling energy systems based on renewable energy is that their short-term supply fluctuates based on environmental factors such as the weather. In mathematics, such uncertainty can be described using stochastic modeling. We describe first results in understanding stochastic

models for physics-based problems and how algorithms can be designed to solve such problems computationally.

Barbara Kaltenbacher and the Department of Mathematics look forward to seeing you at the talk!