

Master's thesis

(Bachelor's thesis)

25.07.2025

Novel MRI measurements of SpinChem© RBR-reactor

Motivation:

Rotating bed reactors (RBR), like the one developed by SpinChem©, are a novel technique used in biochemical process engineering to increase mass transfer in catalytic systems. They allow the catalyst to be separate from the reaction mixture, thus minimising damage on the catalyst while also ensuring homogeneous contact of the reaction mixture with the catalyst. [1] As their application range gets broader and they get used more frequently in labs and industry, a deeper understanding of the hydrodynamics and process parameters within the reactor is necessary.

The institute's unique vertical MRI scanner got recently upgraded with a platform, that enables the operation of stirring equipment while performing measurements. Due to the MRI's ability to measure phase differences and the fluid's velocity we can extract information about the gas hold-up in the packed bed, shear-rates at catalyst and general flow characteristics within the reactor.

As we are still in the prototype phase of many experiments, we are excited for new developments and look forward to develop MRI analysis further. Therefore, the scope of this work will be dynamically shaped by the collaborative successes we achieve in this project

Tasks:

- Literature review on RBRs, their applications and limitations
- 3D design and print MRI-compatible version of an RBR
- Perform MRI measurements
- Evaluate the data
- Outline an experiment plan for further research

Your profile:

- Enthusiastic about developing a new measuring technique
- Interest in experimental work
- CAD and 3D printing experience (ideally)
- Python basics (not essentially)

Starting date: September 2025

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