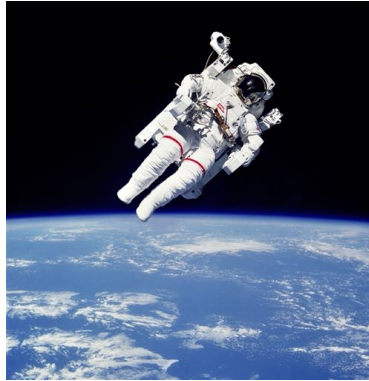


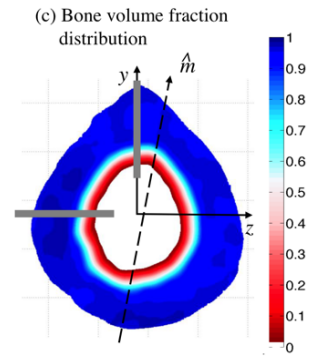
Modelling of bone metabolism during the space flight

master thesis

Musculoskeletal tissues (cartilage, bone, muscle, tendon) underlie constant turnover to ensure tissue quality. For this, tissue degradation and formation are usually in equilibrium. However, the equilibrium can be disturbed by physical activity, immobilization, disease and injury.



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Bone volume fraction [1]

This thesis aims at modelling the dynamics of bone metabolism during the space flight. First, the relevant physiological processes and their interactions are identified. Then, mathematical models for these processes are developed. Finally, these models are validated with the help of clinical data.

It is a collaborative work with Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Universitätsklinikum Erlangen (UKER), Queensland University of Technology (QUT) and European Space Agency (ESA). A possibility of a research visit to QUT may be given during the master thesis period.

necessary requirements

- good knowledge of (continuum) mechanics
- good programming skills in e.g. Python or Matlab
- fluent in either English or German
- interest in combining biological data with computational models

additional qualifications (not necessary)

- basic knowledge of human physiology

Application deadline is **10.01.2025**.

contact

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¹[1] Lerebours C, Buenzli P, Scheiner S, Pivonka P. A multiscale mechanobiological model of bone remodelling predicts site-specific bone loss in the femur during osteoporosis and mechanical disuse. *Biomechanics and Modeling in Mechanobiology*. 2016;15(1):43–67.