

FREIE UNIVERSITÄT BERLIN

Fachbereich Mathematik und Informatik

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D I S P U T A T I O N

Donnerstag, 16. April 2020, 14:00 Uhr

Disputation über die Doktorarbeit von

Frau Lin Liu

Thema der Dissertation:

Unifying metabolic networks, regulatory constraints, and resource allocation

Thema der Disputation:

ETFL: A unified formulation for Expression and Thermodynamics-enabled FLux models

Die Arbeit wurde unter der Betreuung von **Prof. Dr. A. Bockmayr** durchgeführt.

Abstract:

Systems biology has long been interested in models capturing both metabolism and expression in a cell. In a recent paper, Salvy and Hatzimanikatis (2020) proposed an implementation of the metabolism and expression model formalism (ME-models), which they call ETFL, for Expression and Thermodynamics Flux models. ETFL is a hierarchical model formulation, from metabolism to RNA synthesis, that allows simulating thermodynamics-compliant intracellular fluxes as well as enzyme and mRNA concentration levels. ETFL formulates a mixed-integer linear problem (MILP) that enables both relative and absolute metabolite, protein, and mRNA concentration integration. ETFL is compatible with standard MILP solvers and does not require a non-linear solver, unlike the previous state of the art. It also accounts for growth-dependent parameters, such as relative protein or mRNA content. The authors validated ETFL using results obtained from a well-characterized E. coli model. They show that ETFL is able to reproduce proteome-limited growth. It is also possible to subject the model to other analyses, including the prediction of feasible mRNA and enzyme concentrations and gene essentiality.

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

Die Disputation findet aufgrund der besonderen Situation in alternativer Form mittels Videotelefonie via WebEx statt.

Interessierte werden hiermit herzlich eingeladen

[Link zur Disputation \(via WebEx\)](#)

Der Vorsitzende der Promotionskommission
Prof. Dr. A. Bockmayr