Seminar for Doctorands

Control of the Human Cardiovascular-Respiratory System under a Time-Varying Ergometric Workload

Mustafa Habib

In this work a combined model developed by Grodins, Kappel,Peer and Khoo representing human cardiovascular and respiratory system is consid- ered.The cardiovascular part is based on the four compartment represent- ing the blood vessels of pulmonary and systemic circuits.The respiratory part is based on the two compartment representing the luns and tissues. Mechanisms included are Frank-Starling's law, the Bowditch effect. Heart rate and alveolar ventilation are assumed to be the quantities through which the central nervous system controls the arterial partial pressure of carbon dioxide (P a, co2) up to 40mmHg. The transition from rest to ex- ercise under a time varying ergometric workload is simulated. Here the action of cardiovascular and respiratory control is represented by a opti- mal control which minimizes a quadratic cost functional.

Cauchy-Riemann Optimal Control Problems

Muhammad Munir Butt

In this talk we present the formulation of optimal control problems governed by Cauchy- Riemann equations. A distributed control mechanism through divergence and curl sources is considered with the boundary conditions of mixed type. A Lagrange multiplier framework is introduced to characterize the solution to Cauchy-Riemann optimal control problems as the solution of an optimality system. To solve the optimality system, staggered grids and multigrid methods are investigated. Results of numerical experiments validate the proposed optimal control formulation and demonstrate the effectiveness of the staggered-grids multigrid solution procedure.

Mathematical Approximation of Short Term Behavior of Baroreceptors

Asghar Ali

Time: Friday 14 January, 15:00 c.t.

Place: HS 11.02, Heinrichstraße 36/EG, KFU