Mathematical modelling of blood circulation in the brain

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The aim of the thesis is to create a mathematical model of the circulation in the brain, which will be linked to existing models of blood flow in the eyes.

To develop a mathematical model of blood flow in the brain. The model will also account for the pressure in the cerebrospinal fluid. The thesis will consist in the development and implementation of the model. The brain model will then be coupled with an existing model of the eye, which accounts for the pressurisation of the organ, retinal blood flow and aqueous production/drainage. The aim of the work is to understand the mutual relationships of brain and eye pressures, in particular in relation with the possible occurrence of eye diseases, such as glaucoma.

The work will consist in the development of a mathematical model. A starting point the model will be a compartmental 0-dimensional model. The student will learn analytical as well as numerical techniques.

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Basic knowledge of fluid mechanics and mathematical techniques for PDEs

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