

PDE's in Action – Modelling the brain with “Lego bricks”

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Abstract

Surgeons often operate in the dark. They have a limited view of the surface of the organ, and can typically not see what lies hidden inside. Quality images can routinely be taken prior to the surgery, but as soon as the operation begins, the position of the surgeon's target and risky areas he must avoid, continuously change. This forces practitioners to rely on their experience when navigating surgical instruments to, for example, remove a tumor without damaging healthy tissue or cutting through important blood supplies. To solve this problem, Dr. Stéphane Bordas and his team developed a computational method that could be used to guide surgeons during brain surgery.

The aim of this talk is to explain how PDE's (Partial Differential Equations), more precisely FEM (Finite Element Methods), could be applied to solve such kind of problem(s).

References:

- Huu Phuoc Bui, Satyendra Tomar, Hadrien Courtecuisse, Stephane Cotin, Stephane Bordas, *Real-time Error Control for Surgical Simulation*, IEEE Transactions on Biomedical Engineering, 2017
- <https://legato-team.eu/project/medical-simulation/real-time-error-control-for-surgical-simulation/>
- https://www.uni.lu/university/news/latest_news/modelling_the_brain_with_lego_bricks