

Contribution ID: 375

Type: **Poster Presentation**

Modelling and characterizing the folding patterns of the human brain

Monday, 9 July 2018 19:45 (15 minutes)

The human brain consists of folds (gyri) and valleys (sulci) that vary dramatically in their size, extent, and shape across individuals. There is considerable debate among biologists as to how the folding patterns develop and if the folding patterns can be used to diagnose disease. In this presentation, I will discuss some of the mathematical and modelling approaches my research group is developing to study cortical fold formation, Turing patterns, topology, conformal mapping, and conformal invariants are some of the methods we are using to model and characterize the folding patterns of the brain in development, health, and disease. By altering various model parameters, including domain size and scaling, results from our model can be correlated with cortical folding diseases such as lissencephaly and microcephaly.

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Session Classification: Poster Session

Track Classification: Physiology