

Colloquium

Modelling Cortical Spreading Depression and Related Phenomena

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摘要：

Cortical spreading depression or depolarization (CSD) has been the focus of intensive experimental and theoretical study since its discovery by Leao in 1944. The connection between CSD waves and migraine with aura (MwA) and other pathological conditions has made the mathematical study of CSD even more compelling. The quantitative study of CSD has led to mathematical models that incorporate many of the mechanisms known to affect CSD speed, shape, and duration. CSD involves the movement of the major ions (potassium, sodium, chloride, and calcium) in the brain. These ions are transported by diffusion and can go through cell membranes as a result of ionic membrane channels and energy consuming pumps that restore the ionic concentrations to homeostasis. The massive variations in ion concentrations associated with CSD waves also give rise to significant osmotic effects and puts intense stress on the neurovascular coupling that regulates oxygen supply to the brain. In this talk, we will give an overview of the models that have been proposed and the challenges that have remained.

About Prof. Huaxiong Huang

Prof. Huang was trained as an applied mathematician. He received his PhD in Mathematics in 1992 from the University of British Columbia, obtaining his postdoctoral training at Johns Hopkins and Simon Fraser Universities. While at the Fields Institute he remains a professor at York University, where he has been teaching in the Mathematics Department since 1999. His credentials and research interests make him a perfect fit for the Deputy Director. He maintains an active professional life within the mathematics field, editing several journals related to his interests in Mathematical Modelling and Scientific Computing, Financial and Industrial Mathematics, Biomathematics, and Fluid Mechanics.