

PHYSICAL MATHEMATICS SEMINAR

Geometry of branched stream networks

HANSJORG SEYBOLD

Massachusetts Institute of Technology

ABSTRACT:

The geometric complexity of stream networks has been a source of fascination for centuries. Yet a comprehensive understanding of ramification—the mechanism of branching by which such networks grow—remains elusive. Here we show that streams incised by groundwater seepage branch at a characteristic angle of $2\pi/5 = 72^\circ$. Our theory represents streams as a collection of paths growing and bifurcating in a diffusing field. Our observations of nearly 5000 bifurcated streams growing in a 100-km² groundwater field on the Florida Panhandle yield a mean bifurcation angle of $71.9^\circ \pm 0.8^\circ$. This good accord between theory and observation suggests that the network geometry is determined by the external flow field but not, as classical theories imply, by the flow within the streams themselves.

TUESDAY, NOVEMBER 27, 2012

2:30 PM

Building 4, Room 145

*Reception at 3:30 PM in Building 2, Room 290
(Math Dept. Common Room)*

<http://math.mit.edu/pms>



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