Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Plant root and shoot dynamics during subsurface obstacle interaction[1] NATHANIEL CONN, JEFFREY AGUILAR, Georgia Inst of Tech, PHILIP BENFEY, Duke University, DANIEL GOLDMAN, Georgia Inst of Tech — As roots grow, they must navigate complex underground environments to anchor and retrieve water and nutrients. From gravity sensing at the root tip to pressure sensing along the tip and elongation zone, the complex mechanosensory feedback system of the root allows it to bend towards greater depths and avoid obstacles of high impedance by asymmetrically suppressing cell elongation. Here we investigate the mechanical and physiological responses of roots to rigid obstacles. We grow Maize, *Zea mays*, plants in quasi-2D glass containers (22cm x 17cm x 1.4cm) filled with photoelastic gel and observe that, regardless of obstacle interaction, smaller roots branch off the primary root when the upward growing shoot (which contains the first leaf) reaches an average length of 40 mm, coinciding with when the first leaf emerges. However, prior to branching, contacts with obstacles result in reduced root growth rates. The growth rate of the root relative to the shoot is sensitive to the angle of the obstacle surface, whereby the relative root growth is greatest for horizontally oriented surfaces. We posit that root growth is prioritized when horizontal obstacles are encountered to ensure anchoring and access to nutrients during later stages of development.

[1]NSF Physics of Living Systems

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Date submitted: 11 Nov 2016 Electronic form version 1.4