A method to determine the displacement velocity field in the apical region of the Arabidopsis root

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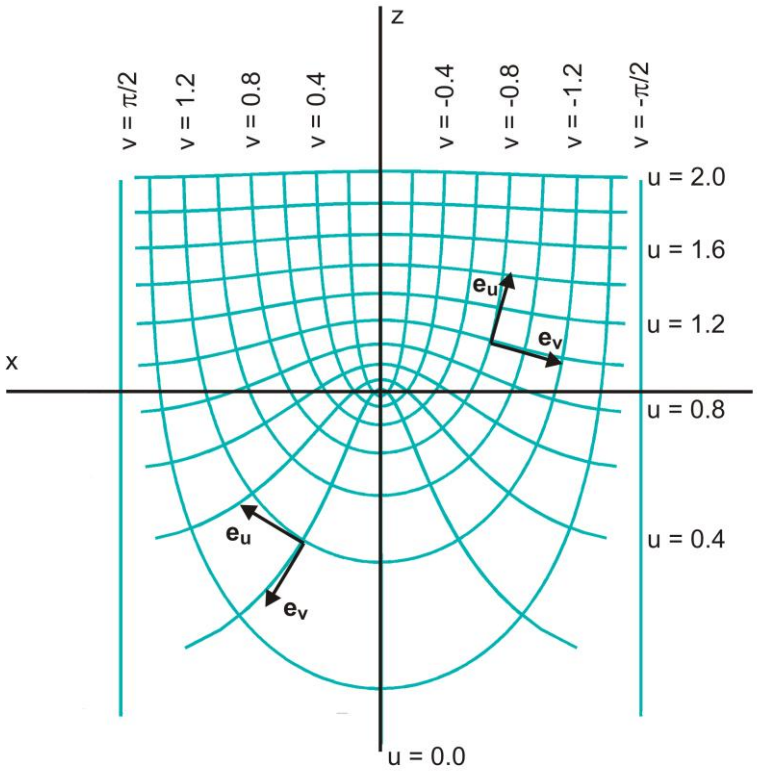
Online Resource S1: The curvilinear orthogonal coordinate system, RC(*u*,*v*,*φ*), used to describe the root apex



The system is represented by traces of the coordinate surfaces on the *xz* plane;
$\mathbf{e}_u$ and $\mathbf{e}_v$ are two unit vectors, the third one $\mathbf{e}_\varphi$ (not shown) is perpendicular to this plane.

Coordinate equations:

$$x = \frac{2}{\pi}\arctan\left(\tanh u \tan v\right)\cos\varphi$$

$$y = \frac{2}{\pi}\arctan\left(\tanh u \tan v\right)\sin\varphi$$

$$z = \frac{1}{\pi}\log\left(\cosh^2 u - \sin^2 v\right)$$

Scale factors:

$$h_u = h_v = \frac{\sqrt{\sinh^2(2u) + \sin^2(2v)}}{\cosh^2 u - \sin^2 v}, \qquad h_\varphi = 2\arctan\left(\tanh u \tan v\right)$$