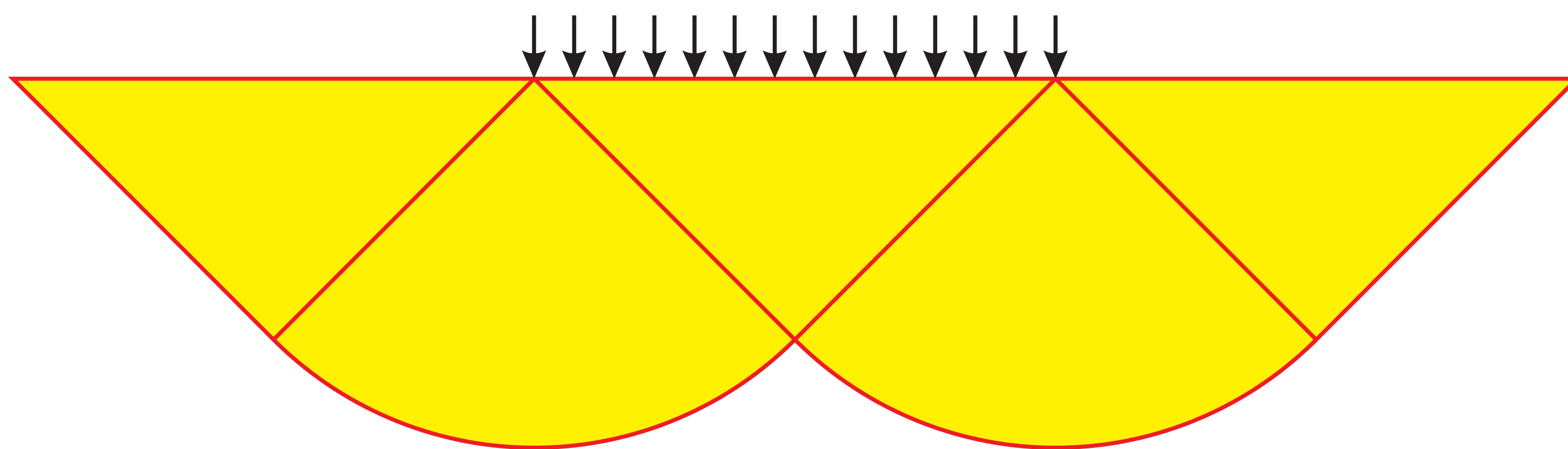
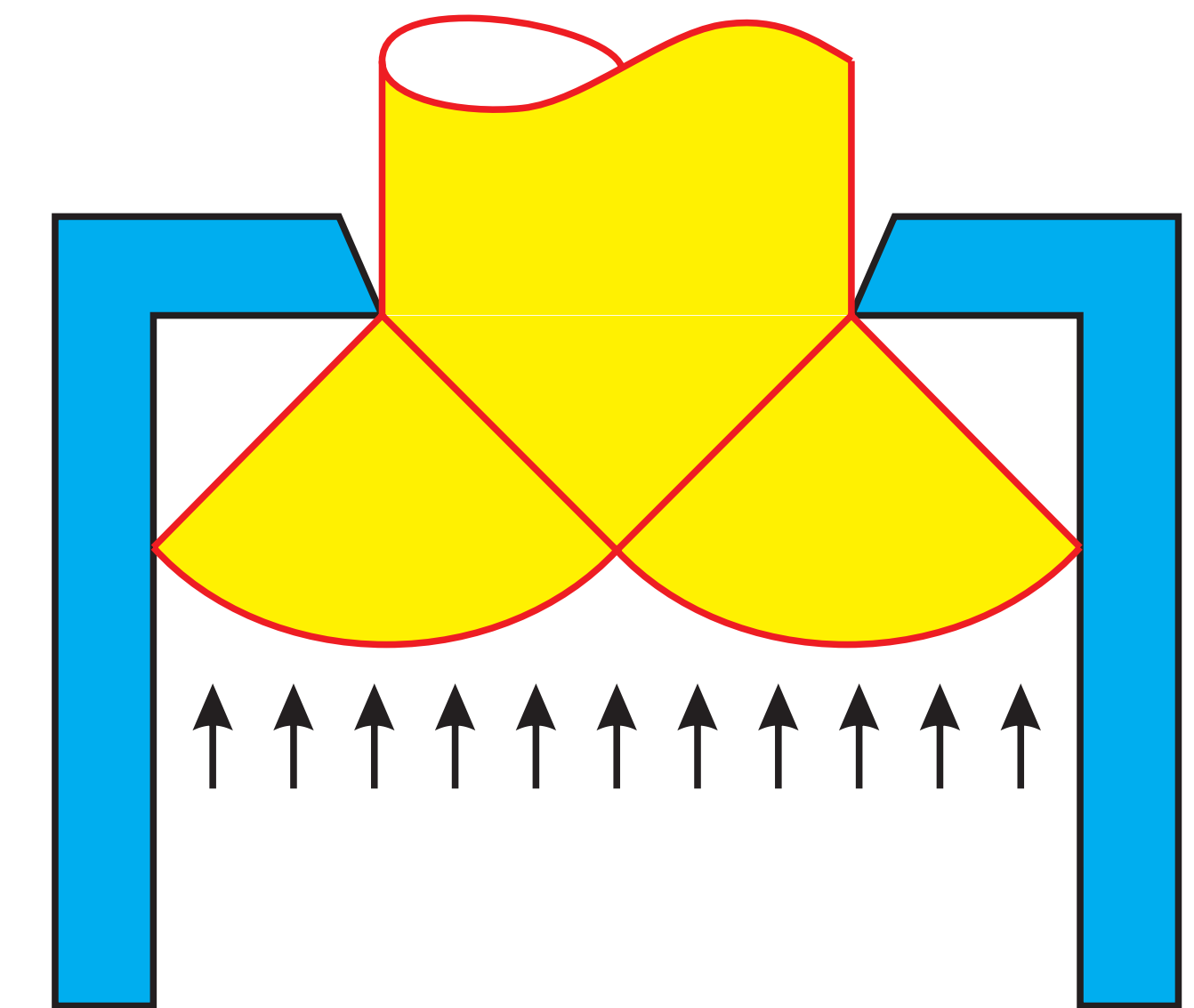


Ideal-plastic yield zones and force cones in tree roots

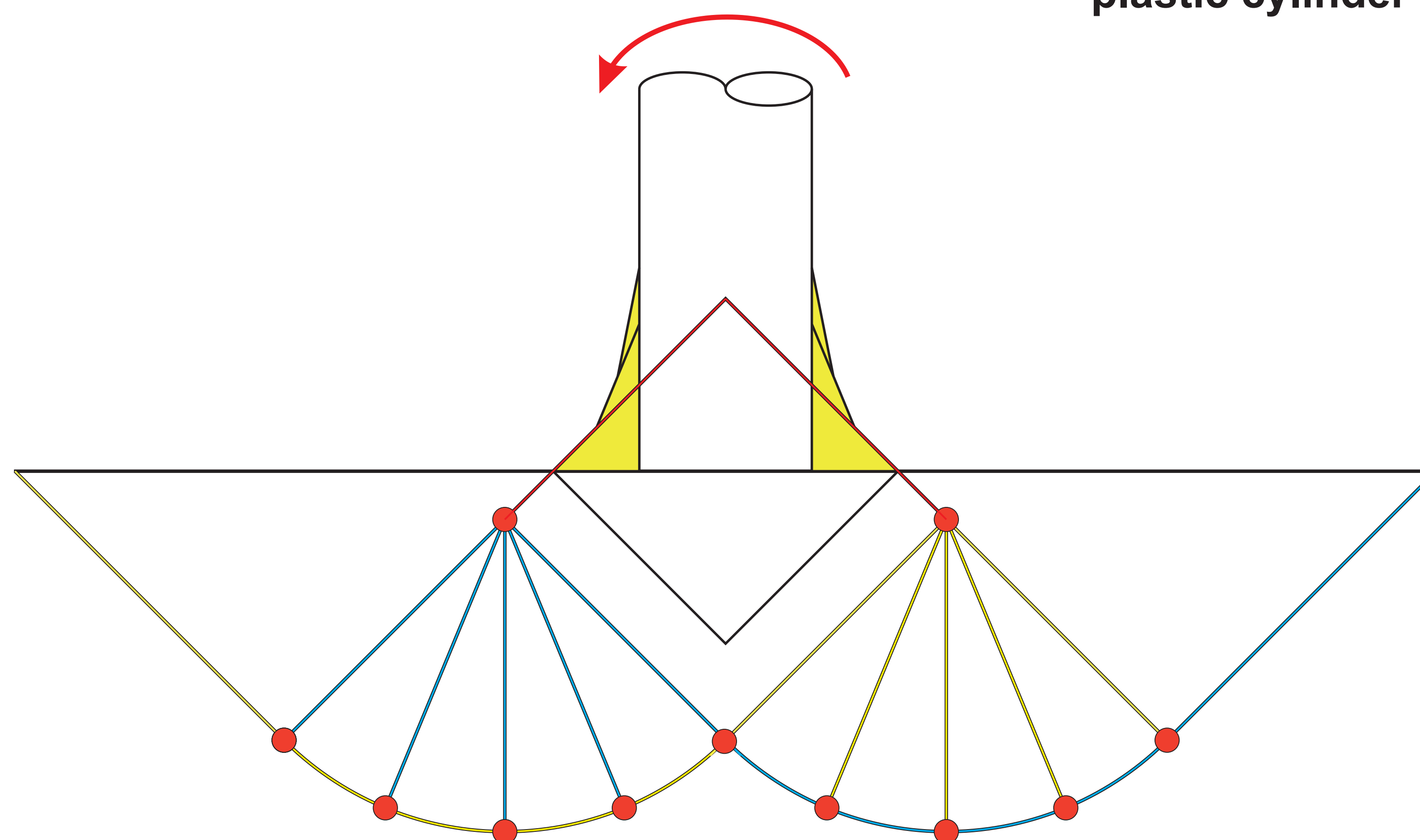
C. Mattheck, I. Tesari, K. Bethge, S. Haller, O. Kraft



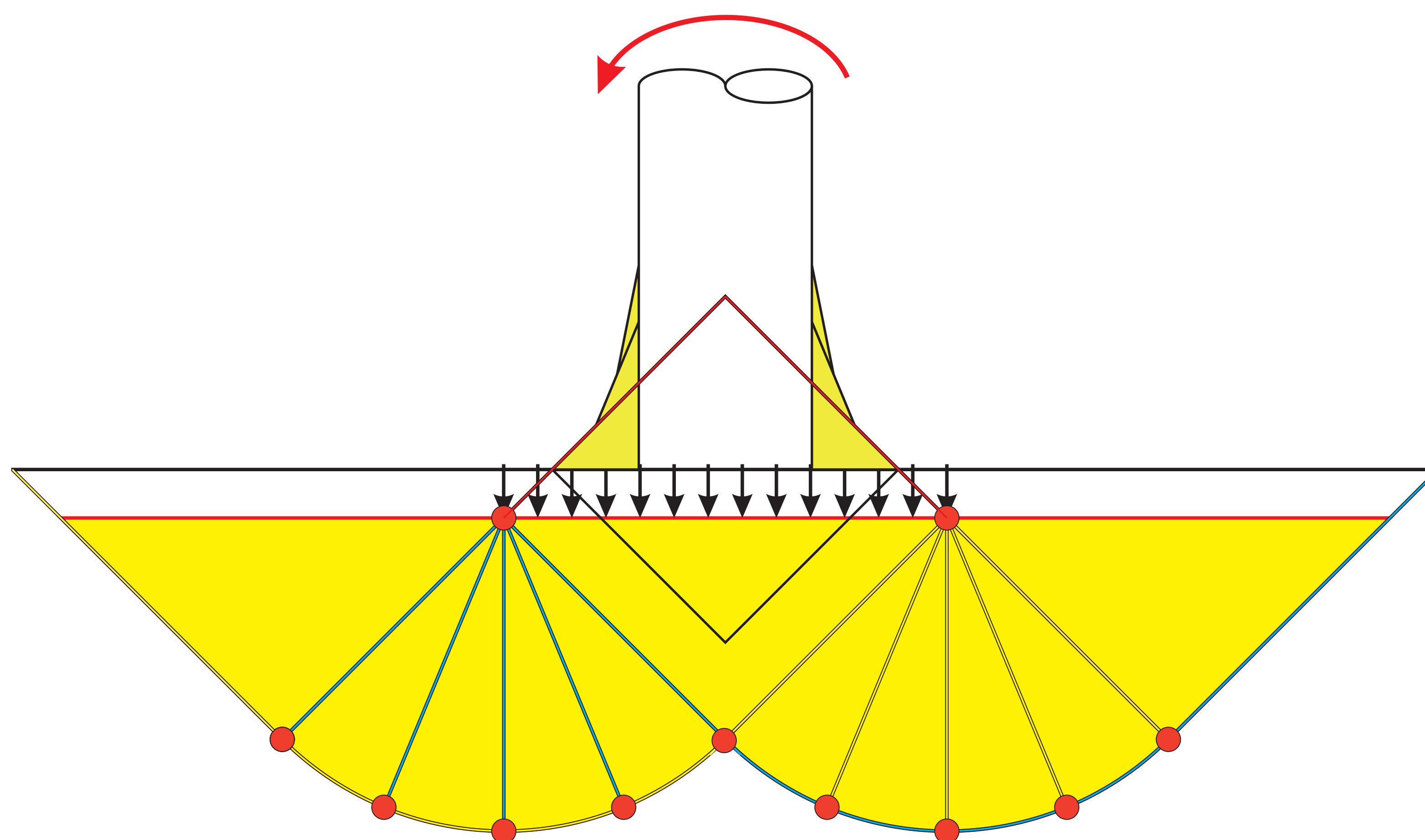
Prandtl [1] has determined the plastic zone in ideally plastic materials.



Hill [2] has shown the plastic zone in a plastic cylinder punched through a matrix.



Mattheck's force cone method separates highly loaded areas from less loaded areas! Regions of highest loads yield first. The roots are obviously to reinforce the „yield zone“ below a tree found here by the force cone method. So the border line of yielding is shifted away from the tree.



Good agreement between the mathematical results by Prandtl and Hill and the force cone results by Mattheck for the root plate below trees.

[1] Prandtl, L.: Über die Härte plastischer Körper. Göttinger Nachr., math.-phys. Kl. 1920, 74-85.

[2] Hill, R.: A theoretical analysis of the stresses and strains in extrusion and piercing. J. Iron and Steel Institute 158, 177-185 (1948).