LiveGraphics3D – making Mathematica graphics come alive

LiveGraphics3D is a Java applet written by Martin Kraus and licensed for commercial use by Wolfram Research which allows 3-D solids created by Mathematica® to be rotated interactively right in the middle of an HTML page.

To use LiveGraphics3D, you must use a web browser supporting Java 1.1 (e.g., Netscape Communicator® 4.0/4.5 or Internet Explorer® 4.0/4.5/5.0). You must also activate Java in the preferences or options menu of your web browser.
The LiveGraphics3D software is available for free downloading (for non-commercial use) at www.treasure-troves.com/buy/math/cdrom/live.html.

Using LiveGraphics3D, Ambjörn Naeve has created a large collection of surface models that illustrate concepts from classical algebraic- and differential geometry. These include the well-known quadric surfaces (ellipsoid, one- and two-sheeted hyperboloid, elliptic- and hyperbolic paraboloid), as well as the less familiar developable surfaces (tangential-, polar- and rectifying developable). They also include the Dupin cyclides, and various forms of so called Generalized Cylinders [2], which are a generalized form of lathed surfaces of special interest within the fields of Computer Vision and Computer Graphics.

There is also a Mathematica animation, which has been converted to interactive web graphics. It concerns the *double cylindrical point focus principle* [1], which is a way to focus planar wave-fronts to a point by reflecting them in two parabolic cylinders. This principle was discoverd by Ambjörn Naeve and Lloyd Cross in 1976.
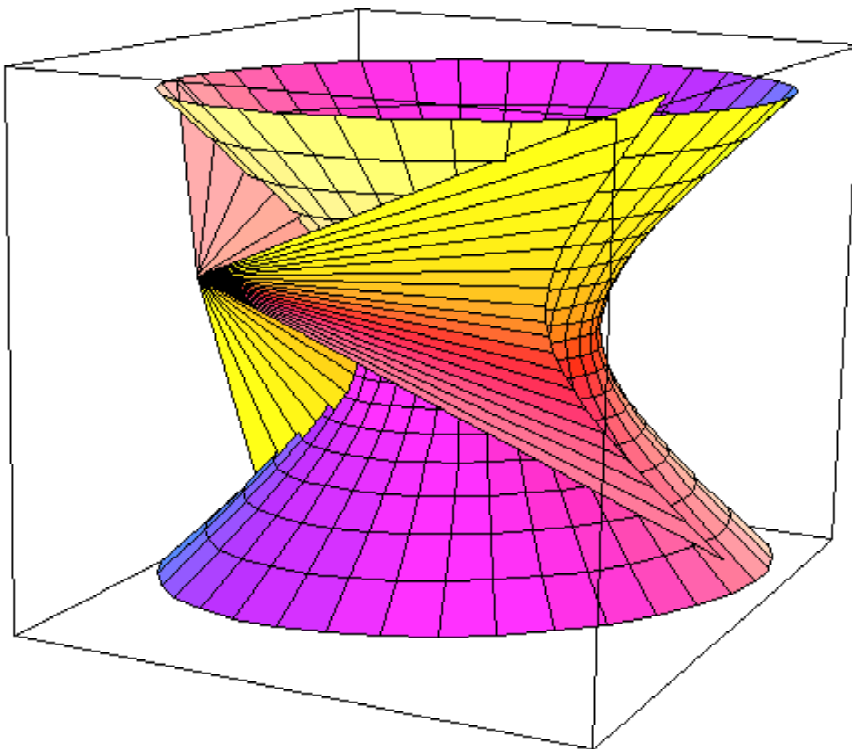

Fig. 1: The tangent cone from a point to a one-sheeted hyperboloid. The corresponding LiveGraphics3D java applet can be viewed at www.nada.kth.se/~osu/math/Geometry/Quadrics/one_sheeted_hyp_tang1.html.

References

[1] Naeve, A., *Focal Shape Geometry of Surfaces in Euclidean Space*, CVAP-130, TRITA-NA-P9319, Dissertation, Department of Numerical Analysis and Computing Science, KTH, Stockholm, 1993.

[2] Naeve., A & Eklundh, J.O., *Representing Generalized Cylinders*, Proceedings of the Europe-China Workshop on Geometrical Modeling and Invariants for Computer Vision, pp. 63-70, Xi'an April 27-29, 1995. Published by Xidian University Press, Xi'an, China, 1995.