

Early Implicit Minimal Surfaces *

See: Catenoid, Helicoid and Scherk Minimal Surfaces

The early minimal surfaces have also implicit representations:

Catenoid: $x^2 + y^2 - \cosh(z)^2 = 0$

Helicoid: $x \cos(z) - y \sin(z) = 0$

Scherk 1-periodic: $\sinh(x) \sinh(y) - \sin(z) = 0$

Scherk 2-periodic: $\exp(z) \cos(x) - \cos(y) = 0$

After the Weierstrass representation was discovered they were not much used – as far as we know. These implicit equations are much less close to the geometry of the surfaces than the Weierstrass representation: other levels of these functions are not minimal and the associate family cannot be obtained from this representation. Although the Gauss map at solution points of the equations is of course the gradient of the implicit function at the solution point (normalized to length 1), this does not give the Gauss map as a meromorphic function.

* This file is from the 3D-XplorMath project. Please see:

<http://3D-XplorMath.org/>