Dynamical flow around a cylinder

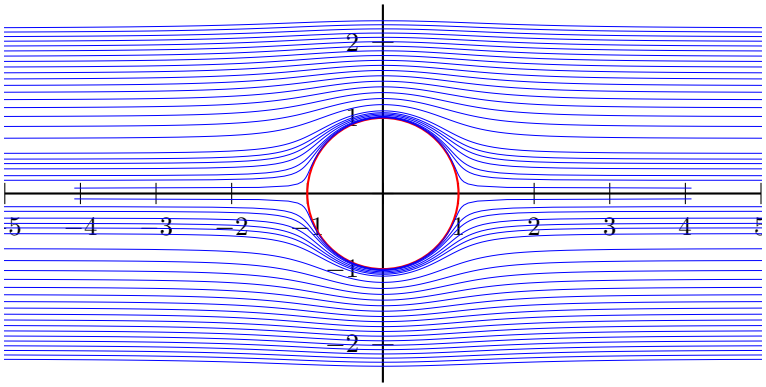
$$\left(r^2 - \frac{c_1}{r}\right)\sin^2\theta = c_0$$

which is the same as

$$r^3 - \frac{c_0}{\sin^2\theta}\cdot r - c_1 = 0$$

which can be solved by the formula of Cardano:

$$r^3 + 3pr + 2q = 0$$



Another possibility was shown by Manfred Braun[1] and gives a much more better result.

The potential flow around a cylinder has the complex potential

$$f(z) = u_\infty(z + a2/z),$$

where u_∞ denotes the velocity at infinity and a is the radius of the cylinder.

The real and imaginary parts of f are the velocity potential φ and the stream function ψ, respectively. The streamlines are obtained by keeping ψ fixed and varying φ. They can be generated in the following way:

1. Solve the equation above for $z = x + iy$ (simple quadratic equation).
2. Keep $\psi = \Im f$ at a fixed value and use $\varphi = Ref$ as the parameter t in `parametricplot`. To this end the basic arithmetic operations for complex numbers, including the square root, have to be implemented.

The attached file generates a figure of the streamlines and equipotential lines around a cylinder. I have used my "personal" complex arithmetic PostScript command. (It would be more elegant to include them in a special style for complex calculations.)

[1] `http://www.tug.org/pipermail/pstricks/2004/001746.html`