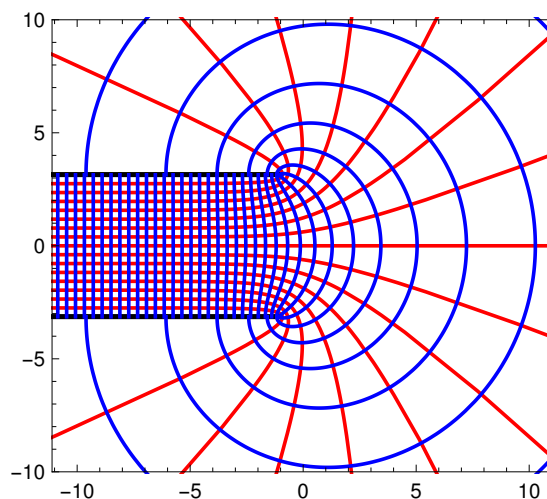
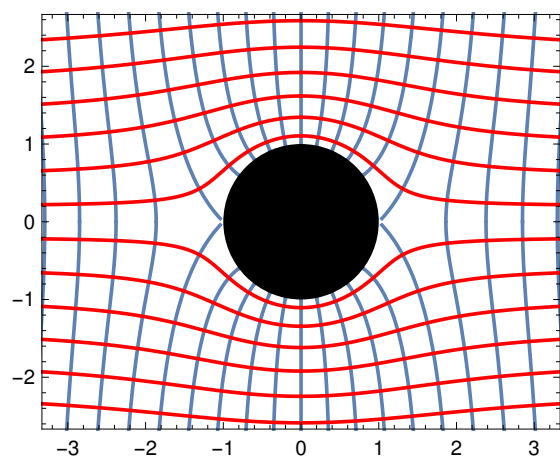
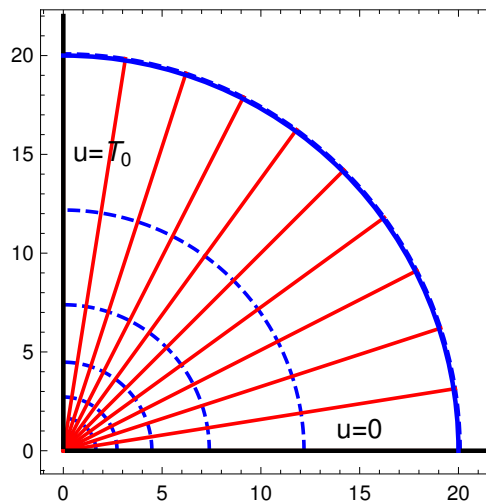
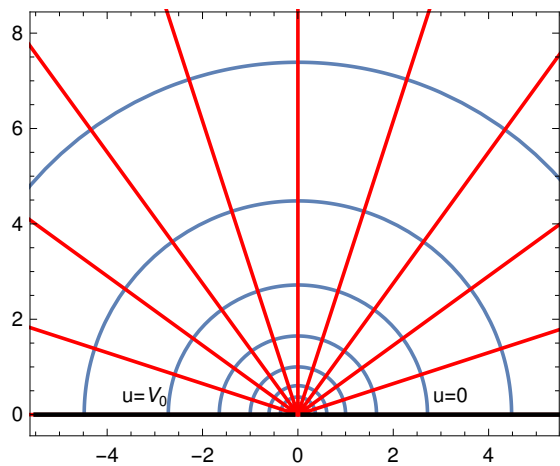


PHYS20672 Complex Variables and Vector Spaces: Handout 2

The following plots show equipotentials together with field lines, lines of heat flow or streamlines as appropriate. Numbers on the axes and the overall density of lines drawn are arbitrary. Within a single plot, of course, the density of lines is proportional to field strength or rate of flow (of heat or incompressible fluid).



In the upper left we have the equipotentials (red) and field lines (blue, pointing clockwise) for the problem of two semi-infinite plates held at different potentials. It can also be interpreted as the velocity potential (blue) and streamlines (red) for water issuing from a narrow slit along the z -axis (in 2D, issuing from the origin).

In the upper right we have the isotherms (red) and lines of heat flow (blue, pointing clockwise) for heat flowing between two plates at right angles to each other, held at different temperatures. The heavy blue line represents an insulated boundary. The electrostatic interpretation is of two plates held at different voltages.

In the lower left we have the equipotentials (blue) and stream lines (red, pointing right) for the fluid flow past a cylinder. It can also be interpreted as the equipotentials (red) and field lines (blue) round an earthed cylinder in a constant external electric field.

In the lower right we have the equipotentials (blue) and stream lines (red) for the fluid flow out of a channel. It can also be interpreted as the equipotentials (red) and field lines (blue) at the edge of a capacitor.