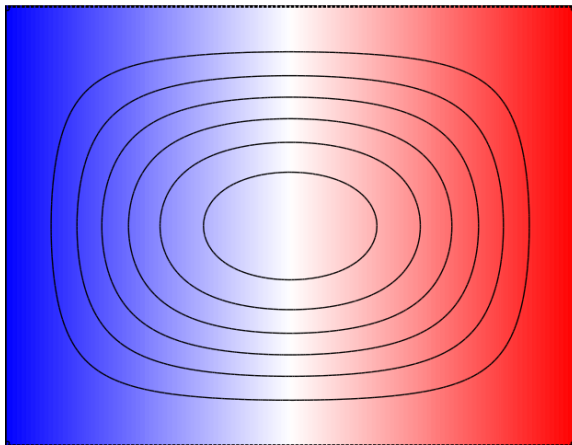# Creeping Convection in a Horizontally Heated Ellipsoid

G. D. McBain
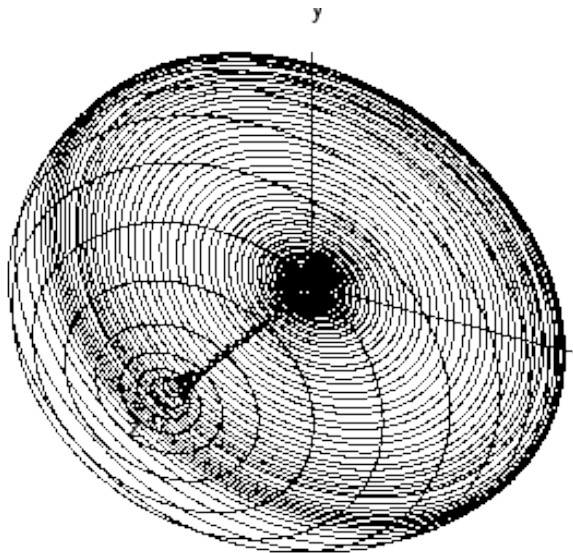
Memjet Australia Pty Ltd
North Ryde, NSW

Twentieth Australasian Fluid Mechanics Conference
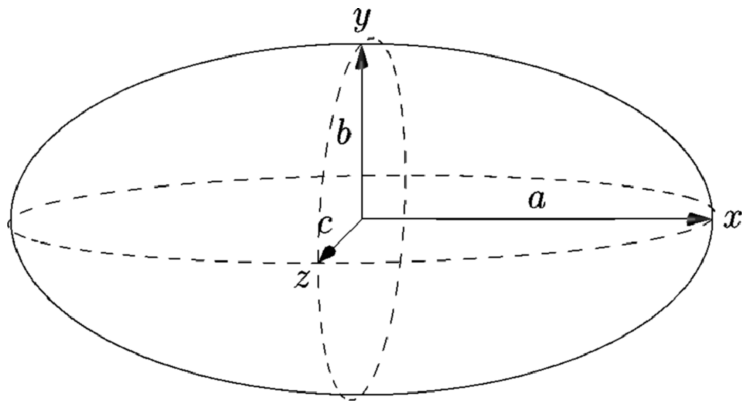Perth, 2016

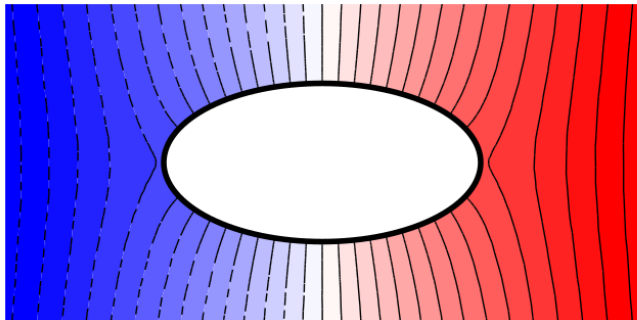# Natural convection in side-heated cavities
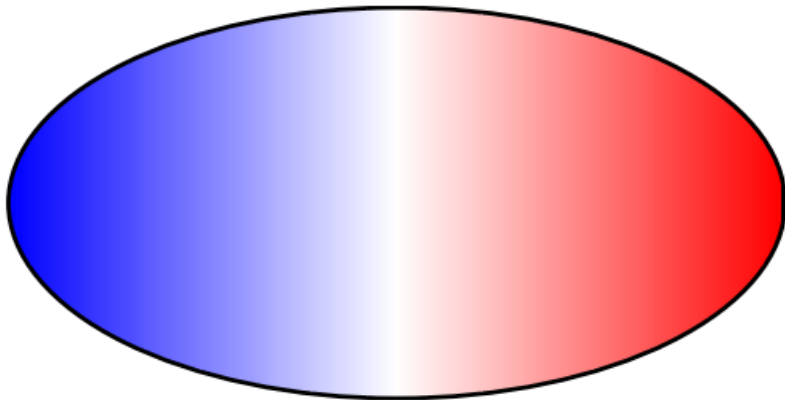
Spherical cavities (McBain 2001)
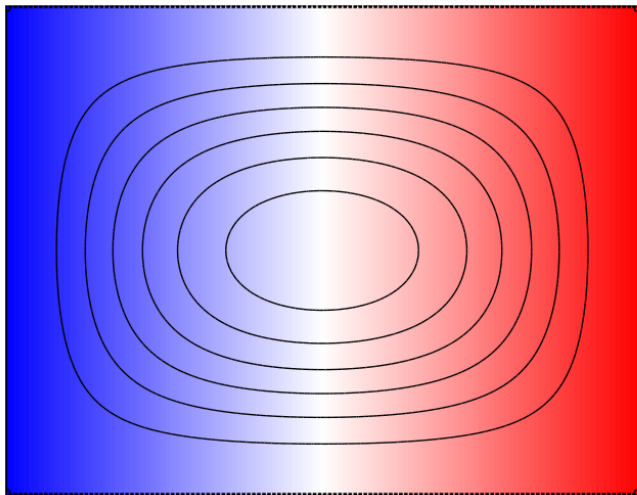
Ellipsoidal cavities
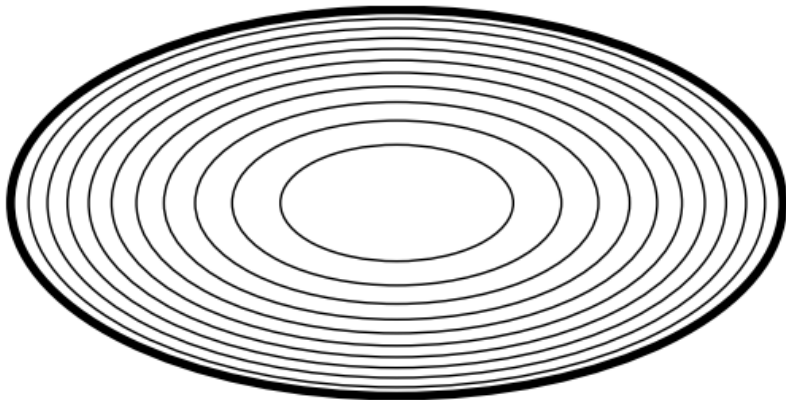
Temperature in the surrounding solid

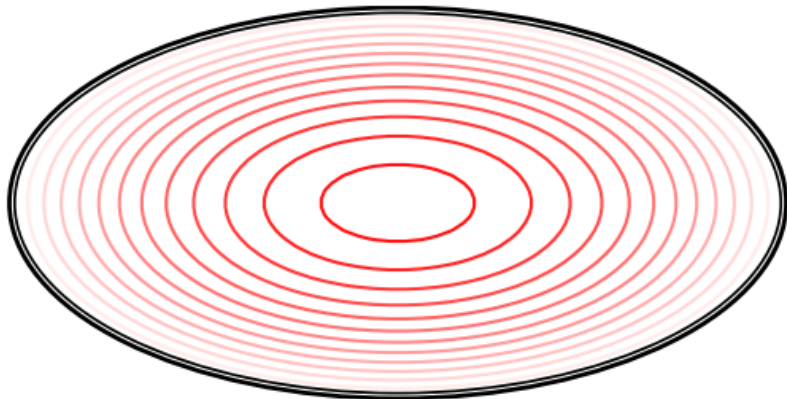# Zeroth-order temperature in the cavity

Creeping convection in rectangle (Batchelor 1954)
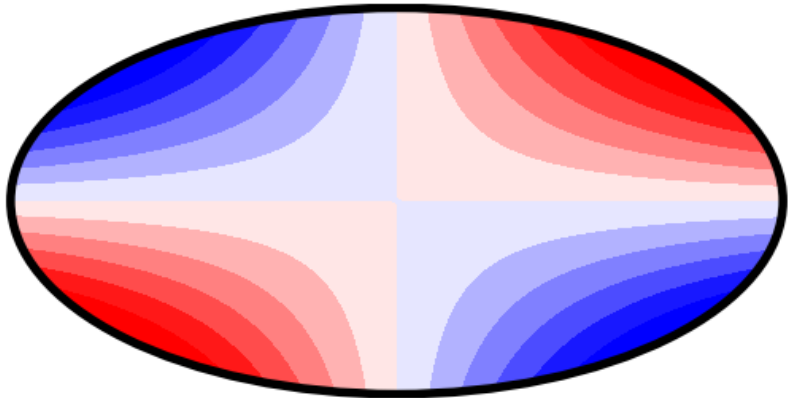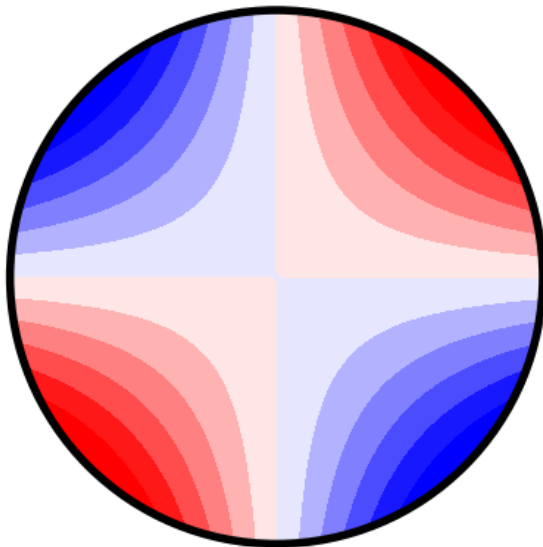
Stream-lines in an ellipse

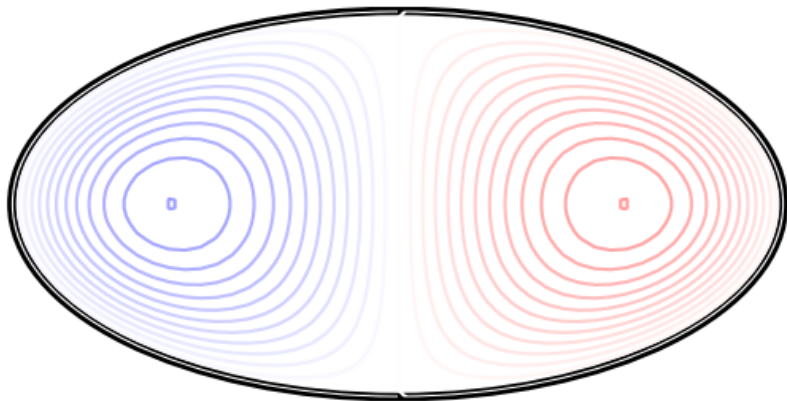# Forced flow in elliptic duct (Mathieu 1853)
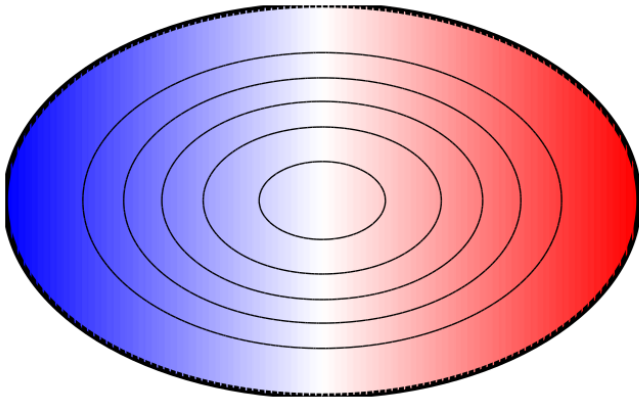
Pressure in side-heated ellipse

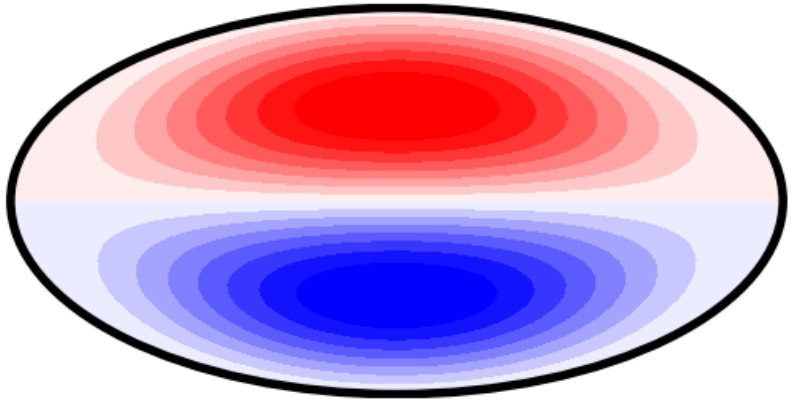# Pressure in side-heated sphere (McBain 2001)

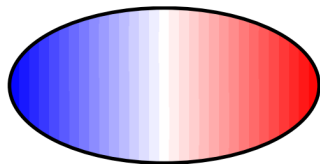# Buoyant flow in elliptic duct (McBain 1999)
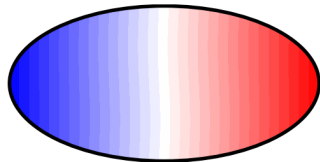
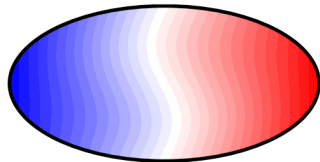# Creeping solution for ellipsoid

First-order correction to temperature

Temperature to first order

$Ra = 10^3$

$Ra = 10^4$

$Ra = 10^5$