

Gulliver, R.

Tori of prescribed mean curvature and the rotating drop. (English) [Zbl 0581.76108](#)

Variational methods for equilibrium problems of fluids, Meet. Trento/Italy 1983, Astérisque 118, 167-179 (1984).

[For the entire collection see [Zbl 0544.00035](#).]

The author considers a fluid body rotating with constant angular velocity ω and subject to surface tension. The gravity is either absent or has net effect. The mean curvature H of the surface of a fluid drop is given by (*) $2H = dv/dr + v/r$, where $v = du/ds$, $z = u(s)$, $r = r(s)$ are equations for a surface of revolution in cylindrical coordinates (r, θ, z) and s is an arclength parameter along the generating curve. The mathematical treatment of the rotating drop is based on the equation (*) and on the theory of elliptic integrals. It is shown that a large family of rotationally symmetric toroidal rotating drops exists and estimates on the possible rates of rotation are derived. The question of stability was not discussed.

Reviewer: A.V.Fedorov

MSC:

[76T99](#) Multiphase and multicomponent flows

[34A12](#) Initial value problems, existence, uniqueness, continuous dependence and continuation of solutions to ordinary differential equations

Cited in **1** Review
Cited in **3** Documents

Keywords:

one-parameter family of tori; surface tension; mean curvature; surface of revolution; generating curve; rotating drop; elliptic integrals; rotationally symmetric toroidal rotating drops; rates of rotation