Atampalage, Madusha; Athukorallage, Bhagya; Toda, Magdalena
The doubly connected minimal surfaces between two circles in parallel planes. (English)
Zbl 1469.53015

In this paper the authors investigate the existences of catenoids between two coaxial circles with arbitrary radii. Given two coaxial circles, it is known from early works of Plateau, Goldschmidt and Lindelöf, that after a critical value of the vertical distance between the circles, the catenoid breaks into two discs. In fact, and depending on the distance between the two circles, there are zero, one or two catenoids, one of which is unstable in the latter case. This problem has been extensively studied in the case when the two circles have the same radius. However, if the radii are different, the problem has received less attention and this paper covers this lack. The authors provide an interesting numerical approach, with many examples, proving the existence of a critical value $\alpha^*$ that shows the above behavior on the existence of catenoids.

Reviewer: Rafael Lopez (Granada)

MSC:
53A10 Minimal surfaces in differential geometry, surfaces with prescribed mean curvature
58E12 Variational problems concerning minimal surfaces (problems in two independent variables)

Keywords:
catenary curves; minimal surfaces; soap films

Software:
Maple

Full Text: DOI

References:

[8] Plateau J., Mémoire sur les phénomènes que présente une masse liquide libre et soustraite à l'action de la pesanteur, Hayez 1843.

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