

On Leonardo da Vinci's paradox

Dr. Lukas Niebel (ETH Zürich)

In this talk, we follow in the footsteps of Leonardo da Vinci. He observed that air bubbles can spiral as they rise through water and described this motion in his notes and sketches.

We revisit this phenomenon in an idealised fluid model: the three-dimensional, two-phase incompressible Euler equations with surface tension.

We construct bubbles and drops whose centroids trace helical paths, with irrotational flow in each fluid phase. These solutions are steady in a frame translating along and rotating about a fixed axis. The proof is a symmetry-breaking bifurcation argument around the stationary spherical solution. I will explain the main ideas behind the construction and discuss a complementary rigidity result highlighting the role of surface tension.

This is joint work with Björn Gebhard and Christian Seis.