Axisymmetric equilibrium shapes of single-wall carbon nanotubes under pressure

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Keywords: carbon nanotubes, Euler–Lagrange equations, equilibrium shapes

Single-wall carbon nanotubes are tube-shaped allotropes of carbon of diameter about a nanometer and length of several hundreds of microns. They have wide spectrum of applications not only in nanotechnology, but also in pharmacy and medicine, e.g. for drug delivery, for tissue regeneration, biosensor diagnosis, extraction and analysis of drugs and pollutants [1].

In the present work, we study the axisymmetric equilibrium shapes of a single-wall carbon nanotube under pressure, using an uncoupled system of a nonlinear third-order and a linear first-order ODEs with appropriate boundary conditions imposed (see [2]). There are well-known analytical solutions of the system for some values of the input physical parameters – the pressure, spontaneous curvature and surface tension. We obtain the equilibrium shapes for small perturbations of those values.

References

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