Abstract Submitted
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Finite amplitude, axisymmetric, capillary waves in a cylindrical container[1] LOHIT KAYAL, SASWATA BASAK, RATUL DASGUPTA, Indian Institute of Technology Bombay — We obtain the solution to the initial value problem for a surface perturba- tion on a deep pool of liquid contained in a cylindrical container. The solution is formulated as a perturbative expansion upto third order in the wave steep- ness parameter a0k. The initial surface perturbation is chosen to be an axisymmetric Bessel function i.e. (r, 0) = a0J0(kr) with k sufficiently large for gravity to be negligible. We solve the nonlinear initial-value problem under the inviscid, irrotational approximation using the Lindstedt-Poincare technique and the Dini series, solving the resultant equations upto O(3), accounting for surface tension. The resultant expression for the time evolution of the inter- face (r, t) is compared against numerical solutions to the incompressible Euler equation. We compare these results to those obtained recently from a sec- ond order expansion, where both capillary and gravity effects are taken into account (Basak, Farsoiya and Dasgupta, 2020, under review; https: // gfm. aps. org/ meetings/ dfd-2019/ 5d764521199e4c429a9b2bd). The differences between the finite amplitude capillary wave and the capillary-gravity wave will be highlighted.

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