



Mathematical Physics

Small-amplitude capillary-gravity water waves: exact solutions and particle motion beneath such waves

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Two-dimensional periodic surface waves propagating under the combined influence of gravity and surface tension on water of finite depth are considered. Within the framework of small-amplitude waves, we find the exact solutions of the nonlinear differential equation system which describes the particle motion in the considered case, and we describe the possible particle trajectories. The required computations involve elliptic integrals of the first kind, the Legendre normal form and a solvable Abel differential equation of the second kind. Some graphs of the results are included.

Subjects: **Mathematical Physics (math-ph)**; Fluid Dynamics (physics.flu-dyn)

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