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| Collana                 | Lecture Notes of the Unione Matematica Italiana, , 1862-9113 ; ; 24   |
| Disciplina              | 515.3534  |
| Soggetti                | Partial differential equations<br>Fourier analysis<br>Dynamics<br>Ergodic theory<br>Functional analysis<br>Partial Differential Equations<br>Fourier Analysis<br>Dynamical Systems and Ergodic Theory<br>Functional Analysis  |
| Lingua di pubblicazione | Inglese   |
| Formato                 | Materiale a stampa  |
| Livello bibliografico   | Monografia  |
| Sommario/riassunto      | The goal of this monograph is to prove that any solution of the Cauchy problem for the capillary-gravity water waves equations, in one space dimension, with periodic, even in space, small and smooth enough initial data, is almost globally defined in time on Sobolev spaces, provided the gravity-capillarity parameters are taken outside an exceptional subset of zero measure. In contrast to the many results known for these equations on the real line, with decaying Cauchy data, one cannot make use of dispersive properties of the linear flow. Instead, a normal forms-based procedure is used, eliminating those contributions to the Sobolev energy that are of lower degree of homogeneity in the solution. Since the water waves equations form a quasi-linear system, the usual normal forms approaches would face the |

well-known problem of losses of derivatives in the unbounded transformations. To overcome this, after a parilinearization of the capillary-gravity water waves equations, we perform several paradifferential reductions to obtain a diagonal system with constant coefficient symbols, up to smoothing remainders. Then we start with a normal form procedure where the small divisors are compensated by the previous paradifferential regularization. The reversible structure of the water waves equations, and the fact that we seek solutions even in space, guarantees a key cancellation which prevents the growth of the Sobolev norms of the solutions.

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