

Steady Water Waves

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For many years the interplay of numerics and theory has been very fruitful in the study of water waves. In this talk I will consider classical 2D traveling water waves with vorticity. By means of local and global bifurcation theory using topological degree, one can prove that there exist many such waves. They are exact smooth solutions of the Euler equations with the physical boundary conditions. Much of the theory in the past has focused on shallow waves or waves of small amplitude. In contrast, the waves we construct can be quite tall and steep and even overhanging. There are periodic ones and solitary ones. New analytical results will be presented on steady waves with favorable vorticity.