Abstract:
In this talk, I will discuss radial and one-dimensional symmetry properties for the stationary incompressible Euler equations in dimension 2 and some related semilinear elliptic equations. I will show that a steady flow of an ideal incompressible fluid with no stagnation point and tangential boundary conditions in an annulus is a circular flow. The same conclusion holds in complements of disks as well as in punctured disks and in the punctured plane, with some suitable conditions at infinity or at the origin. If possible, I will also discuss the case of parallel flows in two-dimensional strips, in the half-plane and in the whole plane. The proofs are based on the study of the geometric properties of the streamlines of the flow and on radial and one-dimensional symmetry results for the solutions of some elliptic equations satisfied by the stream function. The talk is based on joint works with N. Nadirashvili.