1060-31-62 **Darren G Crowdy*** (d.crowdy@imperial.ac.uk), Dept of Mathematics, Imperial College London, 180 Queen's Gate, London, SW7 2AZ, England. *A new calculus for two dimensional vortex dynamics.*

In classical fluid dynamics, an important problem arising in a variety of applications is to understand how vorticity interacts with solid objects (e.g. aerofoils, obstacles or stirrers). For planar flows, a variety of powerful mathematical results exist (complex variable methods, conformal mapping, Kirchhoff-Routh theory) that have been used to study such problems but the constructions are usually restricted to problems with just one, or perhaps two, objects. Expressed another way, most studies deal only with fluid regions that are simply or doubly connected. There has been a general and longstanding perception that problems involving fluid regions of higher connectivity are too challenging to be tackled analytically.

The talk will show that there is a way to formulate the theory so that the relevant fluid dynamical formulae are exactly the same irrespective of the connectivity of the domain. This provides a flexible and unified tool for modelling the fluid dynamical interaction of multiple objects/aerofoils/obstacles/stirrers in ideal flow and their interaction with free vortices. (Received March 17, 2010)