SMALL OSCILLATIONS AND STABLE RELATIVE EQUILIBRIA OF THE N-VORTEX PROBLEM ON THE SPHERE

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Abstract. We consider the N-vortex problem on the sphere assuming that all vortices have equal strength. In the first part of the talk I will present a theoretical framework to analyse solutions of the equations of motion with prescribed symmetries which relies on the discrete reduction of the system by twisted subgroups of the full symmetry group that rotates and permutes the vortices. This approach allows us to prove the existence of several 1-parameter families of periodic orbits and in particular it shows the existence of small nonlinear oscillations emanating from some equilibrium configurations including the Platonic solids for $N = 4, 6, 8, 12, 20$. In the second part of the talk I will present ongoing work on the existence and stability of relative equilibria based on an approach that combines techniques of symmetric Hamiltonian systems with computer assisted proofs.

This is joint work with K. Constantineau, C. García-Azpeitia and J. P. Lessard.

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