1106-37-41 **Nai-Chia Chen*** (chen1945@umn.edu), 206 Church St SE, Minneapolis, MN 55455. *Symmetric Periodic Orbits in Three Sub-Problems of the N-body Problem.*

The Newtonian n-body problem studies the motion of n point masses moving in the Euclidean space, under the influence of their mutual gravitational attraction. The motion is determined by the system of differential equations:

$$\ddot{\mathbf{x}}_i = \sum_{j \neq i}^{n} m_j \frac{\mathbf{x}_j - \mathbf{x}_i}{|\mathbf{x}_j - \mathbf{x}_i|^3}, \quad \mathbf{x}_i \in \mathbf{R}^3,$$

where $\mathbf{x}_i$ and m_i represent the position and the mass of the i-th mass respectively.

We consider three sub-problems of the N-body problem that have two degrees of freedom, namely the $n-$pyramidal problem, the planar double-polygon problem, and the spatial double-polygon problem. We prove the existence of several families of symmetric periodic orbits, including "Schubart-like" orbits and brake orbits, by using topological shooting arguments. (Received May 21, 2014)