1069-35-124   **Eitan Tadmor** and **Dongming Wei*** (`dwei@math.wisc.edu`), 480 Lincoln Dr, Madison, WI 53706. *A variational formula for the weak solutions of pressureless Euler-Poisson equations.*

We derive an explicit representation formula for global weak solutions of the one dimensional system of pressure-less Euler-Poisson equations. This is an extension of the well-known formula for entropy solutions of the scalar inviscid Burgers' equation: since the characteristics of the Euler-Poisson equations are parabolas, our representation of their solution takes the form of a "quadratic" version of the celebrated Lax-Oleinik variational formula. We further extended this result to the multi-dimensional weighted Euler/Euler-Poisson system with symmetry. (Received January 19, 2011)