1109-35-64 **Abbas Momeni*** (momeni@math.carleton.ca). *New variational principles of symmetric boundary value problems.* Preliminary report.

The object of this talk is to present new variational principles for symmetric boundary value problems. Let V be a Banach space and V^* its topological dual. We shall consider problems of the type $\Lambda u = D\Phi(u)$ where $\Lambda : V \to V^*$ is a linear symmetric operator and $\Phi : V \to \mathbb{R}$ is a differentiable convex function whose derivative is denoted by $D\Phi$. It is established that solutions of the latter equation are associated with critical points of functions of the type

$$I_{\lambda,\mu}(u) := \mu\Phi^*(\Lambda u) - \lambda\Phi(u) - \frac{\mu-\lambda}{2}\langle \Lambda u, u\rangle,$$

where λ, μ are two real numbers and Φ^* is the fenchel dual of the function Φ. By assigning different values to λ and μ one obtains variety of new and classical variational principles associated to the equation $\Lambda u = D\Phi(u)$. Namely, Euler-Lagrange principle ($\mu = 0, \lambda = 1$), Clarke-Ekeland least action principle ($\mu = 1, \lambda = 0$), Brezis-Ekeland variational principle ($\mu = 1, \lambda = -1$) and of course many new variational principles such as

$$I_{1,1}(u) = \Phi^*(\Lambda u) - \Phi(u),$$

which corresponds to $\lambda = 1$ and $\mu = 1$. (Received January 20, 2015)