1077-22-568 **Xuhua Liu*** (xzl0002@auburn.edu), Department of Mathematics and Statistics, 221 Parker Hall, Auburn University, Auburn, AL 36849, and **Tin-Yau Tam**. *Gradient Flows for the Minimum Distance to the Sum of Adjoint Orbits.*

Let G be a connected semisimple Lie group and $\mathfrak{g}$ its Lie algebra. Let $\mathfrak{g} = \mathfrak{k} \oplus \mathfrak{p}$ be the Cartan decomposition corresponding to a Cartan involution θ of $\mathfrak{g}$. The Killing form B induces a positive definite symmetric bilinear form B_θ on $\mathfrak{g}$ defined by $B_\theta(X, Y) = -B(X, \theta Y)$. Given $A_0, A_1, \ldots, A_N \in \mathfrak{g}$, we consider the optimization problem

$$\min_{k_i \in K} \left\| \sum_{i=1}^{N} \mathrm{Ad}\,(k_i) A_i - A_0 \right\|,$$

where the norm $\|\cdot\|$ is induced by B_θ and K is the analytical subgroup of G with Lie algebra $\mathfrak{k}$. We obtain the gradient flow of a corresponding smooth function on the manifold $K \times \cdots \times K$. Our results give unified extensions of several results of Li, Poon, and Schulte-Herbrüggen. They are also true for reductive Lie groups. (Received September 07, 2011)