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**Weiyong He\*** ([whe@uoregon.edu](mailto:whe@uoregon.edu)), Department of Mathematics, University of Oregon, Eugene, OR 97403. *The space of volume forms and the Donaldson equation.*

S.K. Donaldson introduced an interesting nonlinear operator for the geodesic equation in the space of volume forms on a compact Riemannian manifold. First we derive estimates to solve the Dirichlet problem of the geodesic equation with applications to the geometric structure of the space of volume forms set up by Donaldson. This new operator is also relevant to some interesting free boundary problems. We shall also consider this operator on Euclidean space. One should be able to classify entire solutions of nonlinear operator. We show this classification by assuming a technical condition. Moreover, entire solutions we construct also give infinite many nontrivial entire solutions to complex Monge-Ampere equation. (Received February 23, 2010)