

1077-58-1102

Swanhild Bernstein, Svend Ebert and Isaac Z. Pesenson* (pesenson@temple.edu). *Splines for Radon transform on compact Lie groups with application to $SO(3)$.*

The Radon transform $\mathcal{R}f$ of functions f on $SO(3)$ has recently been applied extensively in texture analysis, i.e. the analysis of preferred crystallographic orientation. In practice one has to determine the orientation probability density function $f \in L_2(SO(3))$ from $\mathcal{R}f \in L_2(S^2 \times S^2)$ which is known only on a discrete set of points. Since one has only partial information about $\mathcal{R}f$ the inversion of the Radon transform becomes an ill-posed inverse problem.

Motivated by this problem we consider the Radon transform $\mathcal{R}f$ of functions f on general compact Lie groups and develop an approximate inversion algorithm. Our inversion is based on the interpolation of $\mathcal{R}f$ using its values on a discrete set of points. The interpolant is constructed as a minimizer of a certain Sobolev norm.

Our new algorithm fits very well to the application of Radon transform on $SO(3)$ to texture analysis.

This research was supported in part by the National Geospatial-Intelligence Agency University Research Initiative (NURI), grant HM1582-08-1-0019. (Received September 19, 2011)