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Research Article

The Formula of Grangeat for Tensor Fields of Arbitrary Order in n Dimensions

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Abstract

The cone beam transform of a tensor field of order m in n≥2 dimensions is considered. We prove that the image of a tensor field under this transform is related to a derivative of the n-dimensional Radon transform applied to a projection of the tensor field. Actually the relation we show reduces for m=0 and n=3 to the well-known formula of Grangeat. In that sense, the paper contains a generalization of Grangeat's formula to arbitrary tensor fields in any dimension. We further briefly explain the importance of that formula for the problem of tensor field tomography. Unfortunately, for m>0, an inversion method cannot be derived immediately. Thus, we point out the possibility to calculate reconstruction kernels for the cone beam transform using Grangeat's formula.

Abstract

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