

Student Research Talks (StReeTs)

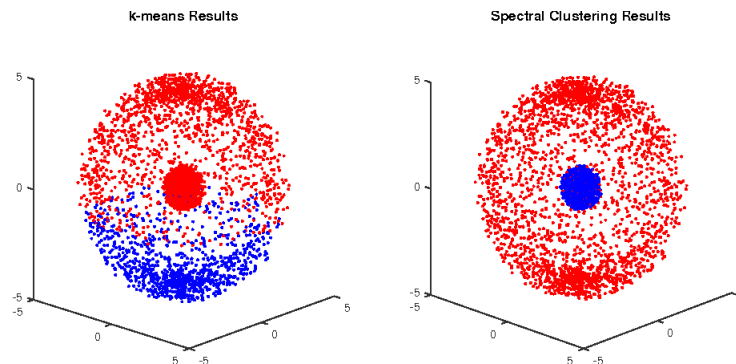
Mason Experimental Geometry Lab (MEGL)

The Hodge Decomposition Theorem

Ryan Vaughn

Department of Mathematics Sciences

George Mason University



Abstract

The Hodge Decomposition Theorem states that the space of differential k -forms $\Omega^k(M)$ on a compact Riemannian manifold (M, g) admits an orthogonal decomposition:

$$\Omega^k(M) = \text{im } d \oplus \text{im } \delta \oplus \ker \Delta_k.$$

A direct consequence of this is that the k -th de Rham cohomology groups of M can be computed from the 0-eigenspace of the k -th Hodge Laplacian Δ_k . In this expository talk, we develop the machinery necessary to understand the Hodge decomposition theorem. In the case $k = 0$, we will also see that the Hodge decomposition theorem provides an elegant explanation for the consistency of spectral clustering in machine learning.

Date: Friday, Mar 29, 2019

Time: 2:30pm–3:20pm

Place: Exploratory Hall 4106

Pizza and soda will be served at the presentation.

For further information or for special accommodations, please contact Sean Lawton via email at slawton3@gmu.edu or drop by the MEGL.