

2009:8  
Självständigt arbete i matematik  
Matematiska institutionen  
Stockholms universitet

## **Christian Helanow: Spherical harmonics: a theoretical and graphical study**

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### **Sammanfattning**

The topic of harmonic polynomials is briefly discussed to show that every polynomial on  $\mathbb{R}^n$  can be decomposed into harmonic polynomials. Using this property it is proved that every function that is square integrable on the hypersphere can be represented by a series of spherical harmonics (harmonic polynomials restricted to the hypersphere), and that the series is converging with respect to the norm in this space. Explicit formulas for these functions and series are calculated for three dimensional euclidean space and used for graphical illustrations. By applying stereographic projection a way of graphically illustrating spherical harmonics in the plane and how a given function is approximated by a sum of spherical harmonics is presented.