Flat manifolds isospectral on p-forms

Juan Pablo Rossetti
Universidad Nacional de Cordoba

Thursday, September 28, 2000
102 Bradley Hall, 4:00 pm
(Tea 3:30 pm Math Lounge)

Abstract

The *spectrum* of a differential manifold M is the collection of the eigenvalues — counted with multiplicities — of the Laplacian Δ acting on smooth functions on M. Two Riemannian manifolds are called *isospectral* when their spectra coincide. Since Δ acts naturally on smooth p-forms on M, one can similarly define p-spectrum and p-isospectrality. The first example of manifolds isospectral but not 1-isospectral was given by C. Gordon in 1986. Other examples have been given by A. Ikeda, R. Gornet and D. Schueth.

In this talk we will describe the Bieberbach groups and the compact flat Riemannian manifolds (c.f.m.) which provide unexpected tools for obtaining simple examples of p-isospectral but not isospectral manifolds. We will see an explicit formula for the multiplicities of the eigenvalues of Δ acting on p-forms on a c.f.m. When one considers what we call a c.f.m. of *diagonal type* this formula is entirely combinatorial and it involves the integral values of the *Krawtchouk polynomials*. As in Coding theory, the integral zeros of these polynomials will play an important role here.

This talk should be accessible to graduate students.