1012-41-41 **Ronald R Coifman** (coifman-ronald@yale.edu), Department of Mathematics, Yale University, 51 Prospect St, New Haven, CT 06511, and **Mauro Maggioni*** (mauro.maggioni@yale.edu), Department of Mathematics, Yale University, 51 Prospect St., New Haven, CT 06511. *Diffusion Wavelets on Graphs and Manifolds.*

The dyadic powers of a diffusion operator T on a manifold or a graph can be used to induce a multiresolution analysis, as in classical Littlewood-Paley and wavelet theory: we construct, with efficient and stable algorithms, multiresolution orthonormal scaling function and wavelet bases associated with this multiresolution analysis, the corresponding downsampling operators, and compress the corresponding powers of the operator. This allows the computation, to high precision, of functions of the operator, notably the associated Green's functions, in compressed form, and their fast application. Classes of operators for which these computations are fast include certain diffusion-like operators, in any dimension, on manifolds, graphs, and in non-homogeneous media. This extends multiscale signal processing to general spaces (such as manifolds and graphs), with corresponding efficient algorithms. Applications include function approximation, denoising, learning on data sets and manifolds, clustering of data sets, multiscale analysis of Markov chains and of complex networks, mesh and texture compression. (Received August 19, 2005)