1054-46-148 **Marius V Ionescu*** (ionescu@math.uconn.edu), Department of Mathematics, 196 Auditorium Road, Unit 3009, University of Connecticut, Storrs, CT 06269-3009. *Powers of the Laplacian on PCF Fractals.* Preliminary report.

Kigami provided an analytic construction of the Laplacian on PCF self-similar fractals based on the energy and a measure on the fractal. A fractafold is the equivalent of a manifold in the fractal world. Strichartz showed how one could extend the construction of the Laplacian to fractafolds. He provides a complete description of the spectrum of the Laplacian for a compact fractafold. The spectrum of the Laplacian on infinite blowups of the Sierpinski gasket has been studied by Teplyaev.

Let K be such a PCF fractal and assume that X is a fractafold without boundary based on K. In this talk we introduce complex powers $(1-\Delta)^{\alpha}$, of the Laplacian on X. We show that these operators form a group which extends the natural powers of the Laplacian. We describe other key properties that these complex powers have. In particular, we show that the operators $(1-\Delta)^{\alpha}$, defined originally on a dense subset of L^2, extend to L^p-bounded operators when the real part of α is non-positive. We also provide a description of the kernels of these operators and study the "singular integral" behavior of them. The key ingredients in our proofs are the heat kernel estimates due to Barlow and Perkins and the Green's function constructed by Kigami. (Received September 11, 2009)