

1018-46-186

**Daniele Guido** and **Tommaso Isola\*** ([isola@mat.uniroma2.it](mailto:isola@mat.uniroma2.it)), Dipartimento di Matematica, Universita' di Roma "Tor Vergata", via della Ricerca Scientifica, 1, 00173 Roma, Italy, and

**Michel L. Lapidus.** *A Trace on Fractal Graphs and the Ihara Zeta Function.* Preliminary report.

Starting with Ihara's work in 1968, there has been a certain interest in the study of zeta functions of finite graphs, by Sunada, Hashimoto, Bass, Stark and Terras, Mizuno and Sato, to name just a few. More recently, Bass (1992) and Clair and Mokhtari-Sharghi (2001) have studied zeta functions for infinite graphs acted upon by a discrete group of automorphisms. The main formula in all these treatments establishes a connection between the zeta function, originally defined as a power series, and the Laplacian of the graph.

In our work, we consider a different class of infinite graphs. They are fractal graphs, i.e. they enjoy a self-similarity property. Using the machinery of operator algebras, we define a zeta function for these graphs and prove an Euler-type product formula, which relates the zeta function with the Laplacian of the graph. We also prove functional equations, and a formula which allows approximation of the zeta function with the zeta functions of finite subgraphs. (Received March 06, 2006)