1113-58-131 **Thierry Coulhon*** (thierry.coulhon@univ-psl.fr), 62bis, rue Gay-Lussac, 75005 PARIS, France, and **Luke G. Rogers** (rogers@math.uconn.edu), Storrs, CT 06269-3009. *Sobolev spaces on fractals may not be algebras.* Preliminary report.

In 1967, Strichartz proved that the Sobolev space

$$L^p_\alpha(\mathbb{R}^n) = \left\{ f \in L^p ; \Delta^{\alpha/2} f \in L^p \right\},$$

where Δ is the non-negative Laplacian, is an algebra for the pointwise product for all $1 < p < +\infty$ and $\alpha > 0$ such that $\alpha p > n$. A more general statement is that $\dot{L}^p_\alpha(\mathbb{R}^n) \cap L^\infty(\mathbb{R}^n)$, where $\dot{L}^p_\alpha(\mathbb{R}^n)$ is a homogeneous Sobolev space, is an algebra for the pointwise product for all $1 < p < +\infty$ and $\alpha > 0$. An interesting question is to which extent one can replace in such statements the Euclidean space $\mathbb{R}^n$ by more general spaces. More recently, in works by Coulhon/Russ/Tardivel-Nachef, Badr/Bernicot/Russ, and Bernicot/Coulhon/Frey, it has been shown that Riemannian manifolds still satisfy the Sobolev algebra property, for $\alpha \in (0, 1)$, provided certain heat kernel estimates are satisfied. In this talk, we will go in the opposite direction and show that on certain fractals endowed with their natural Laplace operator, the Sobolev algebra property is not satisfied for a wide range of α and p. (Received August 17, 2015)