From Thurston's Corrugations to Smooth Fractals

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The Theory of Corrugation was developed in the 70's by Thurston and used later to produce the famous eversion of the sphere shown in the video "Outside In". Corrugations also appear in the heart of the celebrated Nash and Kuiper's Embedding Theorem. This theorem considers isometric maps - i.e. maps that preserve the length of curves- with regularity C^1 and states a density result: one can find such maps arbitrarily close to any map that reduces the length of curves. This result has numerous counterintuitive corollaries including the existence of reduced spheres - i.e. isometrically deformed spheres that fit inside a small ball - or the possibility of performing an isometric eversion of the sphere. In this talk, we shall explore the connection between these paradoxical corollaries and the Thurston's Theory of Corrugations. We shall focus on explicit constructions and visualizations in order to understand the unusual geometry generated by these C^1 isometric maps.