The tip splitting and side branching instabilities of growth patterns: their relation to the formation of a fractal structure.

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Patterns grown in a Laplacian or long range diffusive fields are known to produce fractal structures. Viscous fingering and Dendritic crystal growth serve as two experimental archetypes of isotropic and anisotropic growth respectively. We present results concerning tip splitting and side branching, the two instabilities which affect the tip of these structures. The analysis of these results provides a direct link between the fractal growth and the shape of the tip of these patterns.