Divine Proportion Shape Invariance of DLCA Fractal Aggregates: An Analytical Theory CHRISTOPHER M. SORENSEN, WILLIAM R. HEINSON, AMIT CHAKRABARTI, Kansas State University — A restricted hierarchical model for Diffusion Limited Cluster Aggregates (DLCA) is presented that accurately predicts analytically the fractal dimension, scaling prefactor and shape of the aggregates. This three parameter description is both necessary and sufficient for a complete description of fractal aggregate morphology. We show that aggregate shape is poorly described by the principal radii of gyration and best described by side length ratios of circumscribing rectangular solids with side directions determined by the principal radii of gyration. Remarkably, we find that aggregate shape is described by the Fibonacci series and Divine Proportion in two spatial dimensions and their generalization in three.

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