Abstract Submitted
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The Segmented Universe: Identifying Cosmic Voids with a Multi-scale Geometric Flow[1] ANDREW MILLER, Department of Physics, University of Dallas, Irving, TX 75062, ALI SNEDDEN, LARA ARIELLE PHILLIPS, Department of Physics, University of Notre Dame, Notre Dame, IN 46556 — The complex, filamentary nature of large-scale dark matter and density structure in the universe has been detected by redshift surveys and modeled by large N-body simulations of cosmic evolution. We present a multi-scale geometric flow algorithm as a quantitative method for the analysis of such structure. The algorithm, adapted from medical imaging identification of brain vasculature, segments a volumetric density field according measures of local structure derived from local curvature, identifying vessel-like, sheet-like, and clump-like formations. We apply this structure segmentation to a cold dark matter (CDM) density field prepared from the Virgo Consortium's 2005 Millennium Simulation (MS) output, focusing on identification of regions of cosmic void to determine the robustness of this segmentation method through a systematic comparison of its results with those of previously published void-finding algorithms. The initial results of our application of this segmentation algorithm and the data pipeline used will be presented.

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