

Novel techniques for integrating over implicitly defined curves and surfaces

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Abstract: We describe formulations for integrating over smooth curves and surfaces that are described through a level set function or directly by their closest point mapping. Contrary to the common practice with level set methods, the volume integrands derived from our formulations coincide exactly with the surface or line integrals that one wishes to compute. With these formulations, one can solve elliptic boundary value problems on implicitly defined domains using integral equations. We present numerical results in two and three dimensions and a possible generalization to include surfaces with corners and edges. (Joint work with Richard Tsai from UT Austin and KTH Royal Institute of Technology)