NORMAL APPROXIMATIONS OF GEODESICS ON SMOOTH TRIANGULATED SURFACES

ELI APPLEBOIM 1 EMIL SAUCAN 2 AND JONATHAN STERN 3

ABSTRACT. We introduce a novel method for the approximation of shortest geodesics on smooth triangulated surfaces. The method relies on the theory of normal curves on triangulated surfaces and their relations with geodesics. We also relate in this work to normal surfaces and comment on the possible extension of the method for finding minimal surfaces inside 3-manifolds.

Contents

1. Introduction	2
2. Preliminaries - Normal surfaces and curves	3
2.1. Normal Surfaces	3
2.2. Normal Curves	4
3. Length and curvature measures for normal curves	5
3.1. Length and weight	5
3.2. Graph reflections of normal curves	6
4. Curve shortening flows	8
5. PL Approximations of surfaces and geodesics	10
6. Experimental Results	15
6.1. Analytic surfaces	15
6.2. Colon Surface	15
6.3. Convergence	15
7. Further study	15
References	20

Date: August 9, 2009.

Second Author research partly supported by the Israel Science Foundation.