1147-65-781 **Thomas Pok Yin Yu*** (pty23@drexel.edu), 3141 Chestnut St, Korman 268,Philadelphia, PA 19104. *Numerical Methods for Biomembranes: conforming subdivision methods versus non-conforming PL methods.*

The Canham-Helfrich-Evans models of biomembranes consist of a family of geometric constrained variational problems. We compare two classes of numerical methods for these variational problems based on piecewise linear (PL) and subdivision surfaces (SS). Since SS methods are based on spline approximation and can be viewed as higher order versions of PL methods, one may expect that the only difference between the two methods is in the accuracy order. We prove that a numerical method based on minimizing any one of the 'PL Willmore energies' proposed in the literature would fail to converge to a solution of the continuous problem, whereas a method based on minimization of the bona fide Willmore energy, well-defined for SS but not PL surfaces, succeeds. Motivated by this analysis, we propose also a regularization method for the PL method based on techniques from conformal geometry. Together with standard optimization algorithms, the geometric variational problems can then be solved numerically. To this end, we realize that some of the available optimization algorithms/solvers are capable of preserving symmetry, while others manage to break symmetry; we explore the consequences of this observation. (Received January 28, 2019)