1147-35-477 **Braxton Osting*** (osting@math.utah.edu) and **Dong Wang** (dwang@math.utah.edu). *On an Allen-Cahn-type equation for matrix-valued fields.*

We consider the Cauchy problem for the generalized Allen-Cahn equation,

$$\partial_t \Phi = \Delta \Phi - \epsilon^{-2} \Phi(\Phi^t \Phi - I),$$

where Φ is a matrix-valued field. This equation is the gradient flow for the energy,

$$E(\Phi) := \int \frac{1}{2} \|\nabla \Phi\|_F^2 + \frac{1}{4\epsilon^2} \|\Phi^t \Phi - I\|_F^2,$$

where $\| \cdot \|_F$ denotes the Frobenius norm. We develop a numerical approach to this problem, which is a generalization of the Merriman-Bence-Osher (MBO) diffusion generated method. We extend the Lyapunov function of Esedoglu and Otto to show that the method is non-increasing on iterates and hence, unconditionally stable. We also prove that spatially discretized iterates converge to a stationary solution in a finite number of iterations. We perform several numerical experiments on flat tori and closed surfaces, which, unsurprisingly, exhibit classical behavior from the Allen-Cahn and Ginzburg-Landau equations, but also new phenomena. These new phenomena are further investigated using asymptotic methods. (Received January 24, 2019)