An Attempt to discretize Wittens Deformation using concepts from Discrete Exterior Calculus

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In 1980s, Edward Witten miraculously proved strong and weak Morse inequalities of Morse Theory by a supersymmetric quantum mechanical model. The relation between supersymmetry and Morse theory was simply established by deforming the exterior differential and co-differential operator on a Riemannian manifold by the Morse function. We will give a short review of Morse theory and then discuss how to discretize Wittens deformation in the framework of the discrete exterior calculus.

\[ d \rightarrow d s = e^{-s f(x)} \ d e^{s f(x)} \]

\[ d^* \rightarrow ds^* = e^{sf(x)} \ d^* e^{-sf(x)} \]

Students are welcome to the Informal Discussion Seminar. We assume knowledge in mathematics and in physics at the level of MAT 253 and PHY 202.