1001-14-164   **Fabrizio Catanese** and **Serkan Hosten*** (`serkan@math.sfsu.edu`), San Francisco State University, Mathematics Department, 1600 Holloway Avenue, San Francisco, CA 94132, and **Amit Khetan** and **Bernd Sturmfels**. *The maximum likelihood degree and the likelihood equations.*

Maximum likelihood estimation is a nonlinear optimization problem that arises in statistics. One way to find a gobal optimal solution is to solve the critial equations. The maximum likelihood (ML) degree is the number of complex solutions to these critical equations. First, we give formulas for the ML degree in the dense and sparse cases: we show that the ML degree is equal to the degree of the top Chern class of a sheaf of logarithmic differential one-forms. Furthermore, we give algorithms that compute the critical ideal whose roots are the solutions to the critical equations. We will give examples that illustrate our symbolic-numeric implementation. These will include statistical models in phylogenetics. (Received August 24, 2004)