1139-76-599 **David G Ebin*** (ebin@math.sunysb.edu), Mathematics Department, Stony Brook University, Stony Brook, NY 11794-3651. *Motion with strong constraining force.*

We describe a general theory of motions with a strong constraining force. Let N be a Riemannian manifold and let M be a submanifold. Let V be a function on N for which M is a strict minimum. Assume that D^2V gives a positive definite bilinear form on vectors perpendicular to M. Then a geodesic in M can be approximated by a curve in N which would be a geodesic except that it is accelerated by $-\nabla V$. If V is multiplied by a large constant k, then the distance between the curves is like 1/k. Also the difference between the curves will be oscillatory with a frequency like $\sqrt{k}$. The above construction has several physical applications. We will first discuss the case of slightly compressible fluids. Their motion is shown to be close to incompressible motion and the difference comes from the equation of propagation of sound. Second case: For a fluid with free boundary and surface tension we show that the motion will be close to motion of a fluid with a fixed boundary is the surface tension constant is large. (Received February 20, 2018)