Acoustic propagation in the presence of a non-uniform mean flow is studied numerically by using two different acoustic propagating models, which solve linearized Euler equations (LEE) and acoustic perturbation equations (APE). As noise induced by turbulent flows often propagates from near field to far field in a non-quiescent medium, the effect of non-uniform mean flows on the propagation of acoustic waves is important to be considered. In this paper, 4 different non-uniform mean flows are considered. Results show that the non-uniform mean flows can modify both the amplitude and shape of the acoustic waves as compared to the uniform mean flow. From the numerical point of view, the APE model can predict almost the physical behaviors with a difference in amplitude which is dependent on location, as compared to LEE. On the other hand, APE solves one equation less and thus is computationally less expansive.