Applications of noncommutative geometry to a theory of quantum cosmology have been proposed in [1]. In this proposal, noncommutative deformations of the Wheeler-deWitt equation are carried out by use of the Moyal products. The noncommutativity is imposed on the so-called minisuperspace where the Wheeler-deWitt equation is well defined. In [1], this formulation is also applied to a particular example of the Kantowski-Sachs metric, and an exact wave functional for this metric, together with corresponding new quantum states, are obtained. The article under review should be understood as one of the further developments in this formulation. Particularly, in this article, a WKB-like (or 'semiclassical' in a quantum-mechanical term) approximation is made on time-evolutions (or tunneling processes) of various quantum states obtained in the examples of Kantowski-Sachs metric, Friedmann-Robertson-Walker metric, etc. This calculational method is expected to be useful in application of noncommutativity to theories of cosmology and inflation.

References

[1] H. Garcia-Compean, O. Obregon and C. Ramirez, "Noncommutative quantum cosmology," Phys. Rev. Lett. **88**, 161301 (2002) [arXiv:hep-th/0107250].