Noncommutative geometry arises from an idea of quantizing or discretizing space-time geometry. Realization of such geometry can be made in a various form in field theory, *e.g.*, by use of fuzzy spaces and star products (among operators), etc. Conceptually and mathematically, the noncommutative geometry is described by the so-called spectral triplets as devised by Connes. The spectral action, proposed by Chamseddine and Connes many years ago [1], is in association with the spectral triplets and therefore provides an interesting mathematical tool for application of noncommutative geometry to (quantum) field theory.

A spectral action on a particular metric $S^3 \times S^1$ is calculated in [2] where computational techniques, based on the Poisson summation formula, are developed. In [3] Chamseddine and Connes further develop the computational methods for the spectral action on the Robertson-Walker metric. This is motivated partly in search for application of noncommutative geometry to the standard model of cosmology but the main focus of [3] has been to study of analytic properties of the spectral action; more precisely, to give a concrete expansion form of the spectral action on the Robertson-Walker metric by use of the Euler-Maclaurin formula and the Feynman-Kac formula.

This article under review is a follow-up paper of [3]. It extends and develops the above calculatory method to higher order terms and shows agreement with the previous results in [3]. The article also presents a proof of the rationality of the expansion coefficients that is suggested in the concluding section of [3].

References

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