(2-1) これまでの研究成果のまとめ (英訳文)

■ *Higher Dimensional Black Holes with Non-Trivial Asymptotic Structure*

Recently, higher dimensional black holes have attracted much attention in the context of string theory and the brane world scenario. From a realistic point of view, the extra dimensions need to be compactified to reconcile the higher dimensional gravity theory with our apparently four-dimensional world. Then I focus on black holes with compactified extra-dimensions i.e. Kaluza-Klein black holes. I have studied several aspects of Kaluza-Klein black holes with my collaborators as follows:

I investigated the stability of a five dimensional Kaluza-Klein black hole solution in [8], and the quasi-normal modes [9]. In [1] I constructed five-dimensional multi-black hole solutions with a compactified dimension and showed the spatial cross section of each horizon is admitted to have the topology of a different lens space $L(n;1) = \mathrm{S}^3/\mathbb{Z}_n$ in addition to S^3. I further investigated black holes [2] and rings [5] on Eguchi-Hanson space and smoothness of the horizons [10]. In [13], I analyzed momentarily static initial data sets of the gravitational field produced by two-point sources in five-dimensional Kaluza-Klein spacetimes.

In [4] I also constructed cosmological black hole solutions including solutions discussed in [1]. I found the solution describes the physical process such that two black holes with the topology of S^3 coalesce into a single black hole with the topology of the lens space $L(n;1)$ [3], and I generalized the solution to coalescence of rotating black holes [6] and black rings [12] and I investigated structure of the horizons [7][14].

■ *Anisotropic Inflation*

I proposed with S.Kanno and J.Soda and S.Yokoyama an anisotropic inflation model with the vector impurity in [11], It is expected that the anisotropic inflation yields the statistical anisotropy in fluctuations of CMB. More importantly, the primordial gravitational waves could be induced from curvature perturbations through the anisotropic background. So it might provide the leading component of the primordial gravitational waves in low scale inflationary models which are preferred by recent model construction in string theory.