

Working scheme (研究計画の英訳)

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Generalization of flux for conservation law

The generalization of the flux is one of the important mathematical theme, because the flux of conservation law in mathematical model is not necessarily convex. I showed in [1] that the asymptotic stability of superpositions of stationary wave and rarefaction wave. On the other hand, the asymptotic stability of superpositions of self-similar solution and rarefaction wave is proved by Yoshida-Matsumura recently. I will develop these two results and investigate the asymptotic stability of superpositions of three waves “stationary wave and self-similar solution and rarefaction wave” by applying the characteristic curve method and weighted energy method.

Asymptotic stability in L^1 space

Until now, we have studied the asymptotic stability of viscous conservation law in L^p ($2 \leq p \leq \infty$) space or H^1 space. We also can find that many results of the viscous conservation law were considered in these spaces. Recently, Denis Serre and Heinrich Freristühler showed the asymptotic stability of viscous conservation law in L^1 spaces without the smallness condition on the initial perturbation by using the semi-group theory. As it have been assumed the smallness condition on the initial perturbation in our results, we will apply this L^1 theory to remove these smallness conditions.

Radial symmetric solution for Burgers equation

We are studying the asymptotic analysis for radial symmetric solution for Burgers equation on the multi-dimensional space. When the corresponding Riemann problem admits the rarefaction wave, it became clear that the asymptotic state of the radial symmetric solution for Burgers equation is similar to one of the viscous conservation law in one dimension. However, the asymptotic behavior of the case where the corresponding Riemann problem admits the shock wave has been left open. To predict the asymptotic state of this case, we will apply the result of the traveling wave of viscous conservation law which was researched by Liu-Nishihara('97).

Application to reaction-diffusion equation

We are investigating the Fujita's equation in two dimensional spaces. Although there is many researches for the spherically symmetric solution in two dimensional spaces, existence of non-spherically symmetric solution has not been investigated. To prove this, since it is difficult to apply the mathematical method directly, we start with the application of numerical method. For the numerical method, we now simply calculate by using the Newton method. In the future, by adapting the Bessel transformation method, we treat the behavior on far field in detail. (joint research with Professor Kenta Kobayashi)