Future Research Plans

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The applicant would like to expand on the research described in ⑤ under "Summary of Previous Research Results". The specifics are as follows.

・Large-time behavior of solutions to the two-component system of nonlinear Schrödinger equations

In the future research, we will consider the following two-component system of nonlinear Schrödinger equations, which was derived as a model to describe nonlinear modulation of two monochromatic waves with equal velocity, by generalizing the coefficients of the nonlinear terms:

$$(i\partial_t + 1/2\,\partial_x^2)u = ai|u|^2u + bi|v|^2u, \quad (i\partial_t + 1/2\,\partial_x^2)v = ci|u|^2v + di|v|^2,$$

where *a, b, c, d* are real numbers which appear as $b = c$ in the physical model. The applicant intends to pursue his research with the ultimate goal of clarifying the correspondence between the positive and negative values of the real numbers *a, b, c, d* and the large-time behavior of the solutions to the two-component system of nonlinear Schrödinger equations. By ⑤, we were able to discover the asymptotic behavior of the solution to the two-component system when $a = 0$, $b = -1$, $c = -1$, $d = 0$. The purpose of this study is to clarify the asymptotic behavior of solutions in the cases where $a = 0$ and $d = 0$ do not necessarily hold. By applying the MDFM decomposition of the free Schrödinger evolution operator used in Hayashi and Naumkin in 1998, the initial value problem of the two-component system of nonlinear Schrödinger equations can be attributed to that of the two-component system of nonlinear ordinary differential equations. We aim to solve the two-component system of nonlinear ordinary differential equations and classify the large-time behavior of solutions according to the values of real numbers *a, b, c, d*.