

## **1. The stationly problem of Derivative nonlinear Schroedinger equation**

We study the stationly problem of Derivative nonlinear Schroedinger equation. (We denote it DNLS for short). The problem describes wave propagation in plasma and many authors has been studied. The stationly problem of DNLS is nonlocal nonlinear second order differential equation. The solutions can be represented by using the complete elliptic integrals and elliptic functions. Now we make anticipation by using the software. Our final goal is to prove the global structure.

We report the representation formula in [H1]. In addition, we have posted the paper ([C1]). This study is collaboration with Kunimochi Sakamoto of Hiroshima University and Shoji Yotsutani of Ryukoku University.

### **(2) Kac problem**

We determined the minimiser of Watanabe's variational problem with the winding number 0 and 1. But, we have not determine the minimizer except for the winding number 0 and 1. We have not proved the condition that the solution is simple. Further, we want to study the second variation of Watanabe's variational problem. Our goal is to prove them.

### **(3) Tadjbakhsh-Odeh's variational problem**

In 1976, Tadjbakhsh-Odeh proposed the variational problem of the equilibrium state of elastic ring under the uniform pressure. The condition is that the length is constant under the pressure. There exists the solutions of the variational problem which is not simple curve. Thus, we consider the following problem:

1. Variational problem of the equilibrium state of elastic ring under the ununiform pressure.
2. Variational problem of the equilibrium state of elastic ring unde the lenght is extensible.
3. The functional is blowed up when the curve is not simple.