

# Analyticity of solutions to nonlinear Schrödinger equations

-Top Global University Project, Waseda University-

## REPORT ON STUDY ABROAD

Name: Gaku HOSHINO

Date: March 18, 2016

**1. Study Abroad Destination:** Universidad Nacional Autonoma de Mexico, UNAM

**2. Dates of Stay:** January, 24, 2016 to February 20, 2016

**3. Purpose:**

To study analytic smoothing effect for nonlinear Schrödinger equations

**4. Host Professor:** Prof. Pavel I. Naumkin

**5. Education and Research Activity in the Destination**

**Research Results:**

We consider the Cauchy problem for a system of nonlinear Schrödingers.

$$i\partial_t u + \frac{1}{2m}\Delta u = \lambda u,$$

$$i\partial_t v + \frac{1}{2M}\Delta v = \mu u^2,$$

$$(u, v)(0) = (\phi, \psi),$$

where space dimensions  $n \geq 1$ ,  $\lambda, \mu \in \mathbb{C}$ . Especially, we study analytic smoothing effect for Cauchy problem, without mass resonance condition. If the data satisfying exponential decaying condition and has an analytic continuation, then we have analytic solution belongs to generalized analytic function space characterized by Galilei generator:

$$J_m(t) = e^{i\frac{t}{2m}\Delta} x e^{-i\frac{t}{2m}\Delta}, t > 0.$$

Also we study some inequality in analytic Hardy space defined as:

$$\mathcal{H}_\Omega = \left\{ u : \text{analytic on } \mathbb{R}^n + i\Omega; \sup_{y \in \Omega} \|u(\cdot + iy)\|_{L^2} < \infty \right\}.$$

**6. Other Comments:**

In the previous stay at UNAM, Mexico in February, 2015 supported by Top Global University project, we consider the Cauchy problem for the system of NLS and we obtain some partial results on this study. In this stay we progress the study on above problem and we obtain more interesting results than that obtained in last year. Also we tried new problem that if initial data having analytic continuation on appropriate domain, then we obtain solution which satisfying another condition of analyticity.