博士班資格考試筆試各科目考試範圍與參考書目

Guidelines of Qualify Exams for admission to official candidacy for the PhD degree

偏微分方程(PDEs)

考試範圍 (Scope)：

1. Laplace Equation
2. Heat Equation
3. Wave Equation
4. Maximum Principle
5. Sobolev Spaces and L^2 Theory (Existence of Weak Solutions)
6. Regularity Theories (Schauder estimates, Method of Continuity, de Giorgi-Nash-Moser Iteration, Harnack inequality,…)
7. Basic Calculus of Variations.

參考書目 (References):

[1] L. C. Evans, *Partial differential equations*, Providence, R. I.: American Mathematical Society, Second edition. American Mathematical Society, Providence, RI, 2010.

[2] Q. Han; F. -H. Lin, *Elliptic Partial differential equations*. Second edition. Courant Institute of Mathematical Sciences, New York; American Mathematical Society, Providence, RI, 2011.

[3] J. Jost, *Partial differential equations*. Third edition. Springer, New York, 2013.

備註：

一般來說，偏微分方程（PDEs）的內容很廣。因此，博士生偏微分方程資格考試的內容侷限在前述主題，而這些主題都可以在參考書目中書內找到進一步的細節。這些選考主題涵蓋了二階偏微分方程的三種基本型態與理論，希望考生能透過熟悉這些選列主題來掌握PDEs的基本精神、工具與方法。

Remark:

While PDEs range quite a deal, the qualify exams focus on the topics mentioned above, of which one can find further details in the references. The topics to be tested including the related theory on the three fundamental PDEs of the 2nd order. Hopefully the Ph. D. students would familiarize themselves with the basic concepts, tools and techniques regarding PDEs through the qualify exam.