

〈數值分析〉資格考範圍

1. Finite element methods for elliptic problems: Reference [1] Chapters 0~5, or Reference [2] Chapters 0, 1, 2, 5, or Reference [3]
 - Basic models: Poisson equation, convection- diffusion equation, elasticity equations, Stokes equations, biharmonic equation
 - Lax-Milgram lemma
 - Finite element spaces
 - Approximation theory
 - Error estimates in the H^1 -norm and L^2 -norm, etc.
2. Finite element methods for parabolic problems: Reference [1], Chapter 8
 - The backward Euler method
 - The Crank-Nicolson method
 - The discontinuous Galerkin method
3. Finite element methods for hyperbolic problems: Reference [1], Chapter 9
 - The classical artificial diffusion method
 - The streamline diffusion method
 - The discontinuous Galerkin method
 - Friedrichs' systems
4. Direct and iterative methods for solving linear systems of equations: Reference [1], Chapters 6~7

參考書目：

1. Claes Johnson, *Numerical Solution of Partial Differential Equations by the Finite Element Method*, Cambridge University Press, 1987.
2. S. C. Brenner and L. R. Scott, *The Mathematical Theory of Finite Element Methods*, Springer-Verlag, New York, 1994.
3. E. B. Becker, G. F. Carey, and J. T. Oden, *Finite Elements: An Introduction*, Prentice-Hall, 1981.