§ Spectrum of the Laplacian on a compact manifold

4.2 A class of spectral problems

4.2.1 The closed eigenvalue problems

4.2.2 The Dirichlet eigenvalue problem

(M，g) compact with boundary

$-\Delta_g u = \lambda u$

u=0 on ∂M

4.2.3 The Neumann eigenvalue problem

$-\Delta_g u = \lambda u$

$\nabla u \cdot \gamma = 0$ on ∂M where γ is the inward unit normal vector field

4.2.4 Other problems

$\int_\Omega \Delta_g \varphi\psi dV_g = \int_\Omega \varphi\Delta_g \psi dV_g$ for all fuctions φ, ψ in the domain by Green formula

Green second identity：

$$\int_\Omega (\varphi\Delta_g \psi - \psi\Delta_g \varphi) dV_g = \int_{\partial\Omega} (\varphi \frac{\partial \psi}{\partial n} - \psi \frac{\partial \varphi}{\partial n}) dS_g$$