for ω in terms of coordinates $\{x_i\}$ dual to an integral basis for Λ are invariants of the class $[\omega]$, and are called the elementary divisors of the polarization; $[\omega]$ is called a principal polarization if $\delta_\alpha = 1$ for all α.

Now if S is a compact Riemann surface of genus g with bases $\delta_1, \cdots \delta_{2g}$ for $H_1(S, \mathbb{Z})$ and $\omega_1, \cdots \omega_g$ for $H^0(S, \Omega^1)$, the Jacobian variety

$$\mathcal{J}(S) = \frac{\mathbb{C}^g}{\mathbb{Z}\{\lambda_1, \cdots, \lambda_{2g}\}},$$

where the λ_i are the column vectors,

$$\lambda_i = {}^t\left(\int_{\delta_i} \omega_1, \cdots \int_{\delta_i} \omega_g\right)$$

of the period matrix Ω of S. We have seen in Section 2 of this chapter that if $\delta_1, \cdots, \delta_{2g}$ is a canonical basis for $H_1(S, \mathbb{Z})$, we can choose a basis $\omega_1, \cdots \omega_g$ for $H^0(S, \Omega^1)$ such that

$$\int_{\delta_i} \omega_\alpha = \delta_{i\alpha}, \quad 1 \leq i, \alpha \leq g;$$

the period matrix will then be of the form

$$\Omega = (I, Z),$$

and by the two Riemann bilinear relations also proved in Section 2, $Z = X + \sqrt{-1}\, Y$ is symmetric with $Y > 0$.