```
R₁[s_ , i_ , j_] :=
  s (g_{ji} (g_{j⁺,j} + g_{j,j⁺} - g_{ij}) - g_{ii} (g_{j,j⁺} - 1) - 1 / 2);
Z[K_] := Module[{Cs, φ, n, A, s, i, j, k, Δ, G, ρ1},
    {Cs, φ} = Rot[K]; n = Length[Cs];
    A = IdentityMatrix[2 n + 1];
    Cases[Cs, {s_ , i_ , j_} ⧴
      (A[[{i, j}, {i + 1, j + 1}]] += ( -Tˢ  Tˢ - 1 )
                                       (  0   -1  ))];
    Δ = T^{(-Total[φ]-Total[Cs[[All,1]]])/2} Det[A];
    G = Inverse[A];
    ρ1 = ∑_{k=1}^{n} R₁ @@ Cs[[k]]  -  ∑_{k=1}^{2 n} φ[[k]] (g_{kk} - 1 / 2);
    Factor@
      {Δ, Δ² ρ1 /. α_⁺ ⧴ α + 1 /. g_{α_ ,β_} ⧴ G[[α, β]]}];
```