

```

R1[s_, i_, j_] :=
  s (gji (gj+1,j + gj,j+1 - gij) - gii (gj,j+1 - 1) - 1/2);
ρ[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}]] += (
      
$$\begin{pmatrix} -T^s & T^s - 1 \\ 0 & -1 \end{pmatrix}$$

))]];
  Δ = T(-Total[φ] - Total[Cs[[All, 1]])/2 Det[A];
  G = Inverse[A];
  ρ1 =  $\sum_{k=1}^n R_1 @@ Cs[[k]] - \sum_{k=1}^{2n} \varphi[[k]] (g_{kk} - 1/2)$ ;
  Factor@{Δ, Δ2 ρ1 /. gα,β :-> G[[α, β]]}];

```