

- Show that KappaII in $\text{perp}(U)$

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KappaNorm[a_, b_, i_, j_] :=
  Signature[{a, b}] Signature[{i, j}]  $\kappa$ [Min[{a, b}], Max[{a, b}], Min[{i, j}], Max[{i, j}]]

KappaDash[i_, j_] := Sum[KappaNorm[i, mmm, j, mmm], {mmm, 1, 4}] -
  1/4 Sum[KappaNorm[ii, jj, ii, jj], {ii, 1, 4}, {jj, 1, 4}] KroneckerDelta[i, j]

tt[i_, k_, j_, l_] := KappaDash[i, j] KroneckerDelta[k, l]

KappaII[i_, j_, l_, m_] := 1/2 (tt[i, j, l, m] - tt[i, j, m, l] - tt[j, i, l, m] + tt[j, i, m, l])

Sum[ KappaII[i, j, l, m] 1/2
  (KroneckerDelta[l, i] KroneckerDelta[m, j] - KroneckerDelta[l, i] KroneckerDelta[m, j]),
  {i, 1, 4}, {j, 1, 4}, {l, 1, 4}, {m, 1, 4}]

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