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In[1]:= SetDirectory["/www/user/fdahl/papers/Conjugation/"];
<< kappaLib.m
<< Petrov.m
```

KappaLib v1.1

Petrov routine loaded

### ■ Manually solve S matrix for metaclass XIII

$$\text{In[4]:= } V = \begin{pmatrix} \text{lam1} & 1 & 0 & 0 & 0 & 0 \\ 0 & \text{lam1} & 0 & 0 & 0 & 0 \\ 0 & 0 & \text{lam2} & 1 & 0 & 0 \\ 0 & 0 & 0 & \text{lam2} & 0 & 0 \\ 0 & 0 & 0 & 0 & \text{lam3} & 1 \\ 0 & 0 & 0 & 0 & 0 & \text{lam3} \end{pmatrix};$$

$$B = \begin{pmatrix} 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix};$$

$$W = \begin{pmatrix} 0 & \text{eps1} & 0 & 0 & 0 & 0 \\ \text{eps1} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \text{eps2} & 0 & 0 \\ 0 & 0 & \text{eps2} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \text{eps3} \\ 0 & 0 & 0 & 0 & \text{eps3} & 0 \end{pmatrix};$$

In[7]:= (\* First find matrix that gives matrix in the SWW paper \*)

$$\text{Petrov} \left[ \begin{pmatrix} \text{lam1} & 0 & 0 & 0 & 0 & 0 \\ 0 & \text{lam2} & 0 & 0 & \text{eps2} & 0 \\ 0 & 0 & \text{lam3} & 0 & 0 & 0 \\ \text{eps1} & 0 & 0 & \text{lam1} & 0 & 0 \\ 0 & 0 & 0 & 0 & \text{lam2} & 0 \\ 0 & 0 & \text{eps3} & 0 & 0 & \text{lam3} \end{pmatrix} \right]$$

Out[7]/MatrixForm=

$$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \text{lam1} \\ 0 & \text{eps2} & 0 & 0 & \text{lam2} & 0 \\ 0 & 0 & 0 & \text{lam3} & 0 & 0 \\ 0 & 0 & \text{lam3} & \text{eps3} & 0 & 0 \\ 0 & \text{lam2} & 0 & 0 & 0 & 0 \\ \text{lam1} & 0 & 0 & 0 & 0 & \text{eps1} \end{pmatrix}$$

In[8]:= S = Table[ToExpression["s" <> ToString[i] <> ToString[j]], {i, 1, 6}, {j, 1, 6}];

In[9]:= j1 = Flatten[Transpose[S].B.S - W];

$$j2 = \text{Flatten} \left[ \begin{pmatrix} \text{lam1} & 0 & 0 & 0 & 0 & 0 \\ 0 & \text{lam2} & 0 & 0 & \text{eps2} & 0 \\ 0 & 0 & \text{lam3} & 0 & 0 & 0 \\ \text{eps1} & 0 & 0 & \text{lam1} & 0 & 0 \\ 0 & 0 & 0 & 0 & \text{lam2} & 0 \\ 0 & 0 & \text{eps3} & 0 & 0 & \text{lam3} \end{pmatrix} .S - S.V \right];$$

```
In[11]:= sub = {s11 → 0, s13 → 0, s14 → 0, s15 → 0, s16 → 0, s31 → 0, s33 → 0, s32 → 0, s34 → 0,
  s35 → 0, s43 → 0, s45 → 0, s44 → 0, s46 → 0, s51 → 0, s21 → 0, s52 → 0, s55 → 0, s56 → 0,
  s61 → 0, s63 → 0, s62 → 0, s25 → 0, s22 → 0, s26 → 0, s53 → 0, s64 → 0, s42 → 0,
  s24 → 0, s66 → 0, s12 → 1, s41 → eps1, s54 → 1, s23 → eps2, s36 → 1, s65 → eps3};
Simplify[Union[Join[j2, j1] /. sub]]
S //. sub // MatrixForm
```

```
Out[12]= {0}
```

```
Out[13]//MatrixForm=
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$$\begin{pmatrix} 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & \text{eps2} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ \text{eps1} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & \text{eps3} & 0 \end{pmatrix}$$

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In[14]:= (* export .pdf *)
NotebookPrint[SelectedNotebook[],
  "/www/user/fdahl/papers/Conjugation/notebooks/ClassXIII_Solve.pdf"]
```