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

```
KappaLib v1.1

Petrov routine loaded
```

■ Class XV: (2 2 11)

In[4]:=
$$B = \begin{pmatrix} 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix};$$

In[5]:=
$$V = \begin{pmatrix} lam1 & 1 & 0 & 0 & 0 & 0 \\ 0 & lam1 & 0 & 0 & 0 & 0 \\ 0 & 0 & lam2 & 1 & 0 & 0 \\ 0 & 0 & 0 & lam2 & 0 & 0 \\ 0 & 0 & 0 & 0 & lam3 & 0 \\ 0 & 0 & 0 & 0 & 0 & lam4 \end{pmatrix};$$

In[6]:= `Eigenvalues[V]`

Out[6]= `{lam1, lam1, lam2, lam2, lam3, lam4}`

In[7]:=
$$W = \begin{pmatrix} 0 & eps1 & 0 & 0 & 0 & 0 \\ eps1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & eps2 & 0 & 0 \\ 0 & 0 & eps2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & eps3 & 0 \\ 0 & 0 & 0 & 0 & 0 & eps4 \end{pmatrix};$$

In[8]:= `Eigenvalues[W]`

Out[8]= `{-eps1, eps1, -eps2, eps2, eps3, eps4}`

■ eps3 and eps4 have same block size we we may assume that eps3 <= eps4. By above expression for Eigenvalues[W], we see that eps3<eps4.

In[9]:= `W = W /. {eps3 → -1, eps4 → 1};`

In[10]:= `Eigenvalues[W]`

Out[10]= `{-1, 1, -eps1, eps1, -eps2, eps2}`

In[11]:=
```
Sort[Eigenvalues[W] /. {eps1 → -1, eps2 → -1}]
Sort[Eigenvalues[W] /. {eps1 → -1, eps2 → 1}]
Sort[Eigenvalues[W] /. {eps1 → 1, eps2 → 1}]
```

Out[11]= `{-1, -1, -1, 1, 1, 1}`

Out[12]= `{-1, -1, -1, 1, 1, 1}`

Out[13]= `{-1, -1, -1, 1, 1, 1}`

Thus: eps3=-1, eps4=+1 and eps1,eps2 are arbitrary, but with eps1<=eps2

In[14]:=
$$S = \begin{pmatrix} 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ 0 & 0 & \text{eps2} & 0 & 0 & 0 \\ 0 & \text{eps1} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{pmatrix};$$

- **Check that S is in set mathcal(S)**

In[15]:=
```
Transpose[S].B.S == W
```

Out[15]= True

- **Compute result**

In[16]:=
```
res = S.V.Inverse[S];
res // MatrixForm
```

Out[17]//MatrixForm=
$$\begin{pmatrix} \text{lam2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \text{lam1} & 0 & 0 & \frac{1}{\text{eps1}} & 0 \\ 0 & 0 & \frac{\text{lam3}}{2} + \frac{\text{lam4}}{2} & 0 & 0 & -\frac{\text{lam3}}{2} + \frac{\text{lam4}}{2} \\ \text{eps2} & 0 & 0 & \text{lam2} & 0 & 0 \\ 0 & 0 & 0 & 0 & \text{lam1} & 0 \\ 0 & 0 & -\frac{\text{lam3}}{2} + \frac{\text{lam4}}{2} & 0 & 0 & \frac{\text{lam3}}{2} + \frac{\text{lam4}}{2} \end{pmatrix}$$

In[18]:=
```
Petrov[res]
```

Out[18]//MatrixForm=
$$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \text{lam2} \\ 0 & \frac{1}{\text{eps1}} & 0 & 0 & \text{lam1} & 0 \\ 0 & 0 & \frac{1}{2}(-\text{lam3} + \text{lam4}) & \frac{\text{lam3}+\text{lam4}}{2} & 0 & 0 \\ 0 & 0 & \frac{\text{lam3}+\text{lam4}}{2} & \frac{1}{2}(-\text{lam3} + \text{lam4}) & 0 & 0 \\ 0 & \text{lam1} & 0 & 0 & 0 & 0 \\ \text{lam2} & 0 & 0 & 0 & 0 & \text{eps2} \end{pmatrix}$$

- **Export notebook as .pdf**

In[19]:=
```
NotebookPrint[SelectedNotebook[],
 "/www/user/fdahl/papers/Conjugation/notebooks/ClassXV.pdf"]
```