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

```
KappaLib v1.1

Petrov routine loaded
```

■ Class XX: (33)

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]:=
$$V = \begin{pmatrix} lam1 & 1 & 0 & 0 & 0 & 0 \\ 0 & lam1 & 1 & 0 & 0 & 0 \\ 0 & 0 & lam1 & 0 & 0 & 0 \\ 0 & 0 & 0 & lam2 & 1 & 0 \\ 0 & 0 & 0 & 0 & lam2 & 1 \\ 0 & 0 & 0 & 0 & 0 & lam2 \end{pmatrix};$$

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

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

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

■ Possible choices for eps_i:

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

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

In[9]:=
```
Sort[Eigenvalues[W] /. {eps1 → -1, eps2 → -1}]
Sort[Eigenvalues[W] /. {eps1 → -1, eps2 → 1}]
Sort[Eigenvalues[W] /. {eps1 → 1, eps2 → 1}]
```

Out[9]=
```
{-1, -1, -1, -1, 1, 1}
```

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

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

In[12]:=
```
W = W /. {eps1 → -1, eps2 → 1};
Eigenvalues[W]
```

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

In[14]:=
```
W // MatrixForm
```

Out[14]//MatrixForm=

$$\begin{pmatrix} 0 & 0 & -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix}$$

In[15]:=
```
(* See ClassXX_Solve.m *)
S = {{0, 0, 0, 0, 0, 1}, {0, -1/Sqrt[2], 0, 0, 1/Sqrt[2], 0}, {0, 0, 1, 0, 0, 0}, {0, 0, 0, 1, 0, 0}, {0, 1/Sqrt[2], 0, 0, 1/Sqrt[2], 0}, {-1, 0, 0, 0, 0, 0}};
```

■ Check that S is in the set mathcal(S)

In[16]:=
```
Transpose[S].B.S == W
```

Out[16]= True

■ Compute result

In[17]:=
```
res = Simplify[S.V.Inverse[S]];
res // MatrixForm
```

Out[18]//MatrixForm=

$$\begin{pmatrix} \text{lam2} & 0 & 0 & 0 & 0 & 0 \\ \frac{1}{\sqrt{2}} & \frac{\text{lam1}+\text{lam2}}{2} & -\frac{1}{\sqrt{2}} & 0 & \frac{1}{2}(-\text{lam1}+\text{lam2}) & 0 \\ 0 & 0 & \text{lam1} & 0 & 0 & 0 \\ 0 & \frac{1}{\sqrt{2}} & 0 & \text{lam2} & \frac{1}{\sqrt{2}} & 0 \\ \frac{1}{\sqrt{2}} & \frac{1}{2}(-\text{lam1}+\text{lam2}) & \frac{1}{\sqrt{2}} & 0 & \frac{\text{lam1}+\text{lam2}}{2} & 0 \\ 0 & \frac{1}{\sqrt{2}} & 0 & 0 & -\frac{1}{\sqrt{2}} & \text{lam1} \end{pmatrix}$$

In[19]:=
```
Petrov[res]
```

Out[19]//MatrixForm=

$$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \text{lam2} \\ 0 & \frac{1}{2}(-\text{lam1}+\text{lam2}) & 0 & -\frac{1}{\sqrt{2}} & \frac{\text{lam1}+\text{lam2}}{2} & \frac{1}{\sqrt{2}} \\ 0 & 0 & 0 & \text{lam1} & 0 & 0 \\ 0 & -\frac{1}{\sqrt{2}} & \text{lam1} & 0 & \frac{1}{\sqrt{2}} & 0 \\ 0 & \frac{\text{lam1}+\text{lam2}}{2} & 0 & \frac{1}{\sqrt{2}} & \frac{1}{2}(-\text{lam1}+\text{lam2}) & \frac{1}{\sqrt{2}} \\ \text{lam2} & \frac{1}{\sqrt{2}} & 0 & 0 & \frac{1}{\sqrt{2}} & 0 \end{pmatrix}$$

Export notebook as .pdf

In[20]:=
```
NotebookPrint[SelectedNotebook[],
 "/www/user/fdahl/papers/Conjugation/notebooks/ClassXX.pdf"]
```