In[16]:=
```
SetDirectory["/www/user/fdahl/papers/Conjugation/"];
<< kappaLib.m
<< Petrov.m
```

```
KappaLib v1.1

Petrov routine loaded
```

- **Class XI: (4 11 )**

In[19]:=
$$B = \begin{pmatrix} 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix};$$

In[20]:=
$$V = \begin{pmatrix} lam1 & 1 & 0 & 0 & 0 & 0 \\ 0 & lam1 & 1 & 0 & 0 & 0 \\ 0 & 0 & lam1 & 1 & 0 & 0 \\ 0 & 0 & 0 & lam1 & 0 & 0 \\ 0 & 0 & 0 & 0 & lam2 & 0 \\ 0 & 0 & 0 & 0 & 0 & lam3 \end{pmatrix};$$

In[21]:=
```
Eigenvalues[V]
```

Out[21]=
```
{lam1, lam1, lam1, lam1, lam2, lam3}
```

In[22]:=
$$W = \begin{pmatrix} 0 & 0 & 0 & eps1 & 0 & 0 \\ 0 & 0 & eps1 & 0 & 0 & 0 \\ 0 & eps1 & 0 & 0 & 0 & 0 \\ eps1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & eps2 & 0 \\ 0 & 0 & 0 & 0 & 0 & eps3 \end{pmatrix};$$

In[23]:=
```
Eigenvalues[W]
```

Out[23]=
```
{-eps1, -eps1, eps1, eps1, eps2, eps3}
```

- **eps2 and eps3 have same block size, so we may assume that eps2 <= eps3:**

In[24]:=
```
Sort[Eigenvalues[W] /. {eps1 → -1, eps2 → -1, eps3 → -1}]
Sort[Eigenvalues[W] /. {eps1 → -1, eps2 → -1, eps3 → 1}]
Sort[Eigenvalues[W] /. {eps1 → -1, eps2 → 1, eps3 → 1}]
Sort[Eigenvalues[W] /. {eps1 → 1, eps2 → -1, eps3 → -1}]
Sort[Eigenvalues[W] /. {eps1 → 1, eps2 → -1, eps3 → 1}]
Sort[Eigenvalues[W] /. {eps1 → 1, eps2 → 1, eps3 → 1}]
```

Out[24]=
```
{-1, -1, -1, -1, 1, 1}
```

Out[25]=
```
{-1, -1, -1, 1, 1, 1}
```

Out[26]=
```
{-1, -1, 1, 1, 1, 1}
```

Out[27]=
```
{-1, -1, -1, -1, 1, 1}
```

Out[28]=
```
{-1, -1, -1, 1, 1, 1}
```

Out[29]=
```
{-1, -1, 1, 1, 1, 1}
```

### We may assume that eps2 = -1, eps3 = +1

In[30]:=
```
W = W /. {eps2 → -1, eps3 → 1};
Eigenvalues[W]
```

Out[31]=
```
{-1, 1, -eps1, -eps1, eps1, eps1}
```

In[32]:=
$$S = \begin{pmatrix} 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ \text{eps1} & 0 & 0 & 0 & 0 & 0 \\ 0 & \text{eps1} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{pmatrix};$$

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

In[33]:=
```
Transpose[S].B.S == W
```

Out[33]=
```
True
```

## ■ Compute result

In[34]:=
```
res = S.V.Inverse[S];
res // MatrixForm
```

Out[35]//MatrixForm=
$$\begin{pmatrix} \text{lam1} & 0 & 0 & 0 & 0 & 0 \\ 1 & \text{lam1} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\text{lam2}}{2} + \frac{\text{lam3}}{2} & 0 & 0 & -\frac{\text{lam2}}{2} + \frac{\text{lam3}}{2} \\ 0 & 0 & 0 & \text{lam1} & 1 & 0 \\ 0 & \text{eps1} & 0 & 0 & \text{lam1} & 0 \\ 0 & 0 & -\frac{\text{lam2}}{2} + \frac{\text{lam3}}{2} & 0 & 0 & \frac{\text{lam2}}{2} + \frac{\text{lam3}}{2} \end{pmatrix}$$

In[36]:=
```
Petrov[res]
```

Out[36]//MatrixForm=
$$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & \text{lam1} \\ 0 & 0 & 0 & 0 & \text{lam1} & 1 \\ 0 & 0 & \frac{1}{2}(-\text{lam2} + \text{lam3}) & \frac{\text{lam2}+\text{lam3}}{2} & 0 & 0 \\ 0 & 0 & \frac{\text{lam2}+\text{lam3}}{2} & \frac{1}{2}(-\text{lam2} + \text{lam3}) & 0 & 0 \\ 0 & \text{lam1} & 0 & 0 & \text{eps1} & 0 \\ \text{lam1} & 1 & 0 & 0 & 0 & 0 \end{pmatrix}$$

## ■ Export notebook as .pdf

In[37]:=
```
NotebookPrint[SelectedNotebook[],
 "/www/user/fdahl/papers/Conjugation/notebooks/ClassXI.pdf"]
```