UPDATE BOUNDARY CONDITIONS

New boundary conditions:

a) Perfect conductor condition for the poloidal flow:

$$\vec{B}\cdot\vec{n}=0 \Rightarrow B^{\rho}\hat{e}_{\rho}+B^{\theta}\hat{e}_{\theta}+B^{\zeta}\hat{e}_{\zeta}=0$$

$$\Rightarrow B^{\rho}g_{\rho\rho}+B^{\theta}g_{\rho\theta}+B^{\zeta}g_{\rho\zeta}=0$$

$$\Rightarrow B^{\theta}=-\frac{B^{\rho}g_{\rho\rho}}{g_{\rho\theta}}=-B^{\rho}g_{\rho\rho}g^{\rho\theta}$$

Using the definition of the poloidal component of the magnetic field:

$$B^{\theta}=\frac{1}{\sqrt{g}}\frac{1}{R_0}\frac{\partial\psi}{\partial\rho}$$

So:

$$\Rightarrow \psi_{mj}=\frac{\left(\sqrt{g}\right)_{mj}}{\varepsilon}\left(r_{mj}-r_{mjm1}\right)B^{\theta}_{mj}-\psi_{mjm1}$$

Finally:

$$\Rightarrow \psi_{mj}=-\frac{\left(\sqrt{g}\right)_{mj}}{\varepsilon}\left(r_{mj}-r_{mjm1}\right)B^{\rho}_{mj}\left(g_{\rho\rho}g^{\rho\theta}\right)_{mj}-\psi_{mjm1}$$

Implementation:

VMEC subroutine:

```
call multb(testeq,grreq,1,grtupeq,-1,0.0_IDP,1.0_IDP)
```

CNVT subroutine:

```
call mult(sceq1,test,-1,psi,1,0.0_IDP,1.0_IDP)
psi(mj,lln(l))=-((r(mj)-r(mjm1))*sceq1(mj,lln(l))*mm(l)/r(mj)) - psi(mjm1,lln(l))
```