Page 154, equations (4.44) and (4.45)

Introducing (4.33) into l.h.s. of (4.43) and (4.40) into r.h.s. of (4.43) we obtain:

$$\sum_{\alpha=1}^{n} J^{\alpha}\vec{e}_{\alpha} = \sum_{p=1}^{n-h} J_p \sum_{\alpha=1}^{n} P^{p\alpha}\vec{e}_{\alpha} = \sum_{\alpha=1}^{n}\sum_{p=1}^{n-h} J_p P^{p\alpha}\vec{e}_{\alpha}.$$

Multiplying by $\vec{e}_{\beta}$ $(\beta = 1, 2, \ldots, n)$ results in:

$$J^{\beta} = \sum_{p=1}^{n-h} J_p P^{p\beta}$$

which is (4.44).

Multiplying (4.43) by $\vec{g}_r$ and referring to (A.85) we have:

$$\vec{J}.\vec{g}_r = \sum_{p=1}^{n-h} J_p \vec{g}^{\,p}.\vec{g}_r = J_1\vec{g}^{\,1}.\vec{g}_r + \cdots + J_r\vec{g}^{\,r}.\vec{g}_r + \cdots + J_{n-h}\vec{g}^{\,n-h}.\vec{g}_r = J_r.$$

Then using (A.86) we obtain following expression:

$$J_r = \vec{J}.\vec{g}_r = \vec{J}.\sum_{p=1}^{n-h} g_{rp}\vec{g}^{\,p} = \sum_{p} g_{rp}\vec{J}.\vec{g}^{\,p}$$

which can be further modified introducing (4.40):

$$= \sum_{p} g_{rp}\vec{J}.\sum_{\alpha=1}^{n} P^{p\alpha}\vec{e}_{\alpha} = \sum_{\alpha}\sum_{p} g_{rp}P^{p\alpha}\vec{J}.\vec{e}_{\alpha}.$$

Using (4.33) we finally arrive at:

$$J_r = \sum_{\alpha}\sum_{p} g_{rp}P^{p\alpha}J^{\alpha}$$

which is (4.45).