Page 181, equation (4.175)

At first, let us remind that components a^p of a vector $\vec{a}$ in basis $\vec{g}^p$ are given, according to (A.85), by scalar products $\vec{a}.\vec{g}^p; p = 1, ..., n-h$ in our case; cf. also (A.88):

$$\vec{a}.\vec{g}^p = \sum_r a^r \vec{g}_r.\vec{g}^p = a^p. \tag{1}$$

The components of $\vec{\mu}$ can be expressed using (4.174) as follows:

$$\vec{\mu}.\vec{g}^p = (-\vec{A} + \vec{B}).\vec{g}^p = -\vec{A}.\vec{g}^p + 0 \tag{2}$$

(remember that $\vec{B}$ and $\vec{g}^p$ lie in perpendicular subspaces). The product $-\vec{A}.\vec{g}^p$ represents the components of vector $-\vec{A}$, see (1).

The product $\vec{\mu}.\vec{g}^p$ can be expressed also in the basis of the mixture space $\mathcal{U}$, using (4.173) and (4.40):

$$-A^p = \vec{\mu}.\vec{g}^p = \sum_{\alpha=1}^{n} \mu_\alpha \vec{e}^\alpha . \sum_{\alpha=1}^{n} P^{p\alpha} \vec{e}_\alpha = \sum_{\alpha=1}^{n} \mu_\alpha P^{p\alpha}; \quad p = 1, ..., n-h. \tag{3}$$

Thus the vector $\vec{A}$ has the same components but of opposite sign as expressed by (4.176). This vector is expressed in the basis $\vec{g}_p$ by the (definition) equation (4.175).