$$\alpha \mathbf{p}_{1} + \beta \mathbf{p}_{2} + \gamma \mathbf{p}_{3} = \alpha \mathbf{p}_{1} + (1 - \alpha) \left( \frac{\beta \mathbf{p}_{2} + \gamma \mathbf{p}_{3}}{1 - \alpha} \right) \frac{1}{\mathbf{j}}$$

$$= \alpha \mathbf{p}_{1} + (1 - \alpha) \left( \frac{\beta \mathbf{p}_{2} + \gamma \mathbf{p}_{3}}{\beta + \gamma} \right) \frac{1}{\mathbf{j}}$$