In[7]:= (*Derivation of Eq.[7] for E1 quantification*)

In[2]:= $\text{Solve}\left[2 * \frac{r}{1 + r^2} == \frac{(1 - E1) * E2 * (\text{Cos}[\alpha] + 1)}{1 - E1 * E2^2 + \left(E2^2 - E1\right) * \text{Cos}[\alpha]}, E1\right]$ // FullSimplify

Out[2]= $\left\{\left\{E1 \to \frac{E2 - 2\,r + E2\,r^2 + E2\,\left(1 - 2\,E2\,r + r^2\right)\,\text{Cos}[\alpha]}{E2\,\left(1 - 2\,E2\,r + r^2\right) + \left(E2 - 2\,r + E2\,r^2\right)\,\text{Cos}[\alpha]}\right\}\right\}$

In[3]:= (*Simplify using definitions*)

In[4]:= $a := \left(E2 - 2\,r + E2\,r^2\right) / E2$

In[5]:= $b := E2\,\left(1 - 2\,E2\,r + r^2\right) / E2$

In[6]:= (*Check equality between above expression and Eq[7]*)

In[8]:= $\frac{E2 - 2\,r + E2\,r^2 + E2\,\left(1 - 2\,E2\,r + r^2\right)\,\text{Cos}[\alpha]}{E2\,\left(1 - 2\,E2\,r + r^2\right) + \left(E2 - 2\,r + E2\,r^2\right)\,\text{Cos}[\alpha]} - \left(\frac{a + b * \text{Cos}[\alpha]}{b + a * \text{Cos}[\alpha]}\right)$ // FullSimplify

Out[8]= 0

In[9]:= (*Because it is zero the equation given in Eq.[7] is correct*)