ROMANIAN MATHEMATICAL MAGAZINE

In ΔABC the following relationship holds:

$$\frac{a^2}{(b+c)^2-a^2}+\frac{b^2}{(c+a)^2-b^2}+\frac{c^2}{(a+b)^2-c^2}\ge 1$$

Proposed by Nguyen Hung Cuong-Vietnam

Solution by Daniel Sitaru-Romania

$$\sum_{cyc}\frac{a^2}{(b+c)^2-a^2}=\sum_{cyc}\frac{a^2}{(b+c+a)(b+c-a)}=$$

$$=\sum_{cyc}\frac{a^2}{2s(2s-2a)}=\frac{1}{4}\sum_{cyc}\frac{a^2}{s(s-a)}\overset{BERGSTROM}{\ge}$$

$$\ge\frac{1}{4}\cdot\frac{(a+b+c)^2}{s(s-a)+s(s-b)+s(s-c)}=$$

$$=\frac{1}{4}\cdot\frac{4s^2}{s(s-a+s-b+s-c)}=\frac{s}{3s-a-b-c}=\frac{s}{3s-2s}=1$$

Equality holds for $a=b=c$.