S.2602 If $m \geq 0$ and $x, y, z > 0$ then in the triangle ABC the following relationship holds:

$$\frac{mx+(m+1)y}{(m+1)x+my+(2m+1)z}a^2+\frac{my+(m+1)z}{(m+1)y+mz+(2m+1)x}b^2$$
$$+\frac{mz+(m+1)x}{(m+1)z+mx+(2m+1)y}c^2 \geq 2\sqrt{3}\cdot F$$

Proposed by D.M.Bătinețu-Giurgiu, Dan Nănuți – Romania

Solution by Titu Zvonaru-Romania

We denote $u = my + (m+1)z, v = mz + (m+1)x, w = mx + (m+1)y$. We get:

$$u+v = (m+1)x + my + (2m+1)z, v+w = (2m+1)x + (m+1)y + mz,$$
$$w+u = mx + (2m+1)y + (m+1)z.$$

The given inequality is equivalent to

$$\frac{w}{u+v}a^2+\frac{u}{v+w}b^2+\frac{v}{w+u}c^2 \geq 2\sqrt{3}\cdot F \quad (1)$$

The inequality (1) is Tsintsifas inequality.

Equality holds if and only the triangle ABC is equilateral and

$u = v = w$ (that is $x = y = z$.)