ROMANIAN MATHEMATICAL MAGAZINE

If $a,b,c>0$ then:

$$\sum \frac{a^2+2bc}{(a+b+1)(a+b+c^2)} \le 1$$

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Solution by Tapas Das-India

$$(a+b+1)(a+b+c^2)=$$

$$=\left(\left(\sqrt{a+b}\right)^2+(1)^2\right)\left(\left(\sqrt{a+b}\right)^2+(c)^2\right)\overset{C-S}{\ge}(a+b+c)^2\ (1)$$

$$\sum \frac{a^2+2bc}{(a+b+1)(a+b+c^2)} \overset{(1)}{\le} \sum \frac{a^2+2bc}{(a+b+c)^2}.=$$

$$=\frac{a^2+b^2+c^2+2bc+2ca+2ab}{(a+b+c)^2}=\frac{(a+b+c)^2}{(a+b+c)^2}=1$$

$$Equality\ holds\ for\ a=b=c=1$$