

## AN INTERTWINED CAUCHY—SCHWARZ—TYPE INEQUALITY BASED ON A LAGRANGE—TYPE IDENTITY

IOSIF PINELIS

*Abstract.* Based on an apparently new Lagrange-type identity, a Cauchy–Schwarz-type inequality is proved. The mentioned identity is obtained by using certain “macro” variables; it is hoped that such a method can be used to prove or produce other identities and inequalities.

*Mathematics subject classification (2020):* Primary 26D15; Secondary 26D20.

*Keywords and phrases:* Cauchy–Schwarz-type inequality, Lagrange-type identity.

### REFERENCES

- [1] G. CASSIER, *Problème des moments sur un compact de  $\mathbf{R}^n$  et décomposition de polynômes à plusieurs variables*, J. Funct. Anal., 58 (3): 254–266, 1984.
- [2] G. E. COLLINS, *Quantifier elimination for real closed fields by cylindrical algebraic decomposition*, In Quantifier elimination and cylindrical algebraic decomposition (Linz, 1993), Texts Monogr. Symbol. Comput., pages 85–121, Springer, Vienna, 1998.
- [3] R. E. GREENE AND S. G. KRANTZ, *Function theory of one complex variable*, vol. 40 of Graduate Studies in Mathematics, American Mathematical Society, Providence, RI, third edition, 2006.
- [4] D. HANDELMAN, *Positive polynomials and product type actions of compact groups*, Mem. Amer. Math. Soc., 54 (320): xi+79, 1985.
- [5] J.-L. KRIVINE, *Anneaux préordonnés*, J. Analyse Math., 12: 307–326, 1964.
- [6] MathOverflow, *An inequality concerning Lagrange’s identity*, <http://mathoverflow.net/q/239243> (version: 2016-06-22).
- [7] J. M. STEELE, *The Cauchy-Schwarz master class*, MAA Problem Books Series. Mathematical Association of America, Washington, DC; Cambridge University Press, Cambridge, 2004., An introduction to the art of mathematical inequalities.
- [8] A. TARSKI, *A Decision Method for Elementary Algebra and Geometry*, RAND Corporation, Santa Monica, Calif., 1948.