

## GENERALIZED STEFFENSEN'S INEQUALITY BY MONTGOMERY IDENTITIES AND GREEN FUNCTIONS

ASFAND FAHAD AND JOSIP PEČARIĆ

**Abstract.** A new generalization of Steffensen's inequality and other inequalities related to Steffensen's inequality have been proved. The contribution of these new generalizations has been presented to theory of  $(n+1)$ -convex functions and exponentially convex functions.

*Mathematics subject classification (2010):* Primary 26D10, 26D15, Secondary 26D20.

*Keywords and phrases:* Steffensen's inequality, Green's function, Montgomery's identity,  $(n+1)$ -convex function at a point.

### REFERENCES

- [1] N. I. AKHIEZER, *The Classical Moment Problem and Some Related Questions in Analysis*, Oliver and Boyd, Edinburgh, (1965).
- [2] S. N. BERNSTEIN, *Sur les fonctions absolument monotones*, Acta Math. **52**, (1929), 1–66.
- [3] A. FAHAD, J. PEČARIĆ AND M. PRALJAK, *Generalized Steffensen's Inequality*, J. Math. Inequal. **9**, 2 (2015), no. 2, 481–487.
- [4] A. FAHAD, J. PEČARIĆ AND M. PRALJAK, *Hermite Interpolation of Composition Function and Steffensen-type Inequalities*, J. Math. Inequal. **10**, (2016), no. 4, 1051–1062.
- [5] A. FAHAD, J. PEČARIĆ AND M. I. QURESHI, *Generalized Steffensen's Inequality by Lidstone Interpolation and Montgomery's Identity*, J. Inequal. Appl. **237** (2018).
- [6] E. HEWITT AND K. STROMBERG, *Real and abstract analysis*, 3rd edition, Springer, New York, 1975.
- [7] J. JAKŠETIĆ, J. PEČARIĆ, *Exponential Convexity method*, J. Convex Anal. **20**, 1 (2013), 181–187.
- [8] N. MEHMOOD, R. P. AGARWAL, S. I. BUTT AND J. PEČARIĆ, *New Generalizations of Popoviciu-type inequalities via new Green's functions and Montgomery identity*, J. Inequal. Appl. **2017**, 1 (2017), 108.
- [9] J. PEČARIĆ, *Connections among some inequalities of Gauss, Steffensen and Ostrowski*, Southeast Asian Bull. Math. **13**, 2 (1989), 89–91.
- [10] J. PEČARIĆ, M. PRALJAK AND A. WITKOWSKI, *Linear operator inequality for  $n$ -convex functions at a point*, Math. Inequal. Appl. **18** (2015), 1201–1217.
- [11] J. PEČARIĆ, F. PROSCHAN AND Y. L. TONG, *Convex functions, Partial Orderings and Statistical Applications*, Academic Press, New York, 1992.
- [12] J. PEČARIĆ, K. SMOLJAK KALAMIR AND S. VAROŠANEC, *Steffensen's and related inequalities (A comprehensive survey and recent advances)*, Monographs in inequalities 7, Element, Zagreb, 2014.
- [13] P. RABIER, *Steffensen's inequality and  $L^1 - L^\infty$  estimates of weighted integrals*, Proc. Amer. Math. Soc. **140**, 2 (2012), 665–675.
- [14] J. F. STEFFENSEN, *On certain inequalities between mean values, and their application to actuarial problems*, Skand. Aktuariedtskr. **1** (1918), 82–97.