

One method for proving some classes of analytical inequalities

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Abstract

This paper focuses on the development of automated techniques for proving mixed trigonometric polynomial inequalities of the form:

$$f(x) = \sum_{i=1}^n \alpha_i x^{p_i} \sin^{q_i} x \cos^{r_i} x > 0,$$

where $p_i, q_i, r_i \in N_0$, $\alpha_i \in R \setminus \{0\}$ and $x \in (0, \frac{\pi}{2})$. An algorithm that reduces proving of such inequalities to proving of the corresponding polynomial inequalities is developed. It is shown that many open problems as well as various inequalities recently published in renowned journals can be proved using the proposed algorithm.

Keywords: Analytic inequalities, mixed trigonometric polynomial functions, automatic proving

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