SHARP INEQUALITIES FOR SOLUTIONS OF
MULTIPOINT BOUNDARY VALUE PROBLEMS

PATRICIA J. Y. WONG

Abstract. This paper considers the following continuous and discrete multipoint boundary value problems:
\[ x^{(n)}(t) \geq 0, \ 0 \leq t \leq 1, \ x^{(j)}(t_i) = 0 \text{ and } \Delta^k y(k_i) = 0, \ k = 0, \ldots, m, \ \Delta^m y(k) = 0, \]
where \( j = 0, \ldots, n_i - 1, \ i = 1, \ldots, r, \ \sum_{i=1}^{r} n_i = n, \ 0 = t_1 < t_2 < \cdots < t_r = 1, \)
and \( 0 = k_1 < k_1 + n_1 < k_2 < k_2 + n_2 < \cdots < k_r \leq k_r + n_r - 1 = m + n. \) We offer
lower bounds for solutions of these boundary value problems in terms of \( \sup_{0 \leq t \leq 1} |x(t)| \)
and \( \max_{k \in \{0, \ldots, m+n\}} |y(k)|. \) These bounds further lead to inequalities for related Green’s functions
which are very useful in the study of positive solutions of boundary value problems.


Key words and phrases: Continuous and discrete multipoint boundary value problems, differential and
difference inequalities, Green’s function.

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