LYAPUNOV TYPE INEQUALITY FOR THE
EQUATION INCLUDING 1-dim p-LAPLACIAN

KOHTARO WATANABE

Abstract. Lyapunov type inequality, for the existence of the solution of the equation including (generalized) p-Laplacian:

$$(-1)^{(m)}\big(\big|u^{(m)}(x)\big|^{p-2}u^{(m)}(x)\big)^{(m)} = r(x)|u(x)|^{p-2}u(x) \quad (a \leqslant x \leqslant b)$$

under clamped boundary condition is obtained. The usage of the best constant of L^p Sobolev inequality clarifies the process for obtaining such inequality.

Mathematics subject classification (2010): 34B27, 46E35.
Keywords and phrases: p-Laplacian, Lyapunov inequality, Sobolev inequality, best constant.

REFERENCES

[1] R. BROWN AND D. HINTON, *Lyapunov inequalities and their applications*, Surveys on classical inequalities, 2000, Kluwer Academic Publisher.
[2] C. HA, *Eigenvalues of a Strum-Liouville problem and inequalities of Lyapunov type*, Proc. of A.M.S. **126** (1998), 3507–3511.
[3] J. P. PINASCO, *Lower bounds for eigenvalues of the one-dimensional p-Laplacian*, Abst. Appl. Analysis **2004**, 2 (2004), 147–153.
[4] J. P. PINASCO, *Comparison of eigenvalues for p-Laplacian with integral inequalities*, Appl. Math. and Computation **182** (2006), 1399–1404.
[5] K. WATANABE, Y. KAMETAKA, A. NAGAI, H. YAMAGISHI, K. TAKEMURA, *Symmetrization of functions and the best constant of 1-dim L^p Sobolev inequality*, J. Inequal. and Appl. **2009** (2009), Article ID 874631.
[6] X. YANG, *On inequalities of Lyapunov type*, Appl. Math. and Comp. **134** (2003), 293–300.

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Paper MIA-15-58

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