

---

# OPTIMAL CONDITIONS FOR MAXIMUM PRINCIPLE FOR PERIODIC PROBLEMS

**Gabriela Holubová**

We consider the linear second-order periodic problem

$$-u'' + p(t)u = h(t), \quad u(0) = u(\omega), \quad u'(0) = u'(\omega)$$

with a sign-changing coefficient  $p$  and provide new possible answers to one of its related fundamental questions:

*For which  $p$  does a nonnegative  $h$  result in a nonnegative  $u$ ?*

In other words, for which  $p$  does the maximum principle hold. We can find several necessary and/or sufficient conditions on the coefficient  $p$  in the extensive relevant literature. Optimality and especially applicability and verifiability of these conditions are crucial for further studies of related nonlinear problems.

Inspired by our previous results concerning the fourth-order problems, we state alternative series of (optimal and/or verifiable) conditions on  $p$  based on the principal weighted eigenvalue of the corresponding linear operator. We also present particular examples and comparison with some so far known conditions.

Gabriela Holubová, Department of Mathematics and NTIS, Faculty of Applied Sciences, University of West Bohemia, Czech Republic  
e-mail : [gabriela@kma.zcu.cz](mailto:gabriela@kma.zcu.cz)

---