

NONEXISTENCE OF SOLUTIONS FOR SECOND-ORDER INITIAL VALUE PROBLEMS

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Abstract. We consider nonexistence of solutions for second-order initial value problems. Two results are given: one in which the problems are singular in the time variable, and one in which the problems are singular in both the time and state variables.

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REFERENCES

- [1] R. P. AGARWAL AND DONAL O'REGAN, *Singular Differential and Integral Equations with Applications*, Springer, New York, 2003.
- [2] AFGAN ASLANOV, *On the existence of a solution of a second-order singular initial value problem*, Math. Methods Appl. Sci. **38**, (2015), 980–990.
- [3] ABDELHAMID BENMEZAI AND WASSILA ESSERHANE, *Existence of positive solutions for a singular second-order boundary value problem*, J. Abstr. Differ. Equ. Appl. **3**, (2012), 28–41.
- [4] ABDELHAMID BENMEZAI, WASSILA ESSERHANE AND JOHNNY HENDERSON, *Nodal solutions for singular second-order boundary-value problems*, Electron. J. Differential Equations **156**, (2014), 39 p.
- [5] ABDELHAMID BENMEZAI, JOHN R. GRAEF AND LINGJU KONG, *Positive solutions to a two point singular boundary value problem*, Differ. Equ. Appl. **3**, (2011), 347–373.
- [6] PAVOL BRUNOVSKÝ, ALEŠ ČERNÝ AND MICHAEL WINKLER, *A singular differential equation stemming from an optimal control problem in financial economics*, Appl. Math. Optim. **68**, (2013), 255–274.
- [7] YONGPENG CHEN AND BAOXIA JIN, *Positive solutions of singular second-order integral boundary value problems*, J. Math. Res. Appl. **34**, (2014), 337–348.
- [8] HE PING CHENG, GUANG CHONG YANG AND WEN YONG YAN, *New results of nonlinear second-order singular initial value problems*, Nonlinear Funct. Anal. Appl. **10**, (2005), 665–676.
- [9] J. A. CID, O. L. POUSO AND R. L. POUSO, *Existence of infinitely many solutions for second-order singular initial value problems with an application to nonlinear massive gravity*, Nonlinear Anal. Real World Appl. **12**, (2011), 2596–2606.
- [10] J. A. CID, R. L. POUSO AND R. ENGUIÇA ROQUE, *Sharp conditions for the existence of solutions of second-order autonomous differential equations*, Mediterr. J. Math. **4**, (2007), 191–214.
- [11] MEIQIANG FENG, XUEMEI ZHANG AND WEIGAO GE, *New existence theorems of positive solutions for singular boundary value problems*, Electron. J. Qual. Theory Differ. Equ. **13**, (2006), 9 p.
- [12] NICHOLAS FEWSTER-YOUNG AND CHRISTOPHER C. TISDELL, *Existence of solutions to derivative-dependent, nonlinear singular boundary value problems*, Appl. Math. Lett. **28**, (2014), 42–46.
- [13] PETIO KELEVEDJIEV AND NEDYU POPIVANOV, *Second-order initial value problems with singularities*, Bound. Value Probl. **2014**:161, 15 p.
- [14] LISHAN LIU, YING WANG, XINAN HAO AND YONGHONG WU, *Positive solutions for nonlinear singular differential systems involving parameter on the half-line*, Abstr. Appl. Anal. (2012), 20 p.
- [15] YANSHENG LIU AND BAOQIANG YAN, *Multiple positive solutions for a class of nonresonant singular boundary-value problems*, Electron. J. Differential Equations **42** (2006), 11 p.

- [16] R. L. POUSO, *Necessary and sufficient conditions for existence and uniqueness of solutions of second-order autonomous differential equations*, J. London Math. Soc. **71** (2005), 397–414.
- [17] BAOQIANG YAN, DONAL O'REGAN AND RAVI P. AGARWAL, *Multiplicity and uniqueness results for the singular nonlocal boundary value problem involving nonlinear integral conditions*, Bound. Value Probl. **2014**, 22 p.