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# Existence and asymptotic behavior of strongly monotone solutions of nonlinear differential equations

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## Abstract

Two types of nonlinear differential systems

$$x' + p(t)y^\alpha = 0, \quad y' + q(t)x^\beta = 0; \quad (\text{A})$$

$$x' - p(t)y^\alpha = 0, \quad y' - q(t)x^\beta = 0 \quad (\text{B})$$

are considered under the assumption that  $\alpha$  and  $\beta$  are positive constants such that  $\alpha\beta < 1$  and  $p(t)$  and  $q(t)$  are continuous regularly varying functions on a neighborhood of infinity. An attempt is made to obtain precise information on the existence and asymptotic behavior of strongly monotone regularly varying solutions  $(x(t), y(t))$  of (A) and (B) whose  $x$ -components or  $y$ -components are slowly varying. It is shown that the results thus obtained are applied to the generalized Thomas-Fermi equations of the form  $(p(t)|x'|^{\alpha-1}x')' = q(t)|x|^{\beta-1}x$  to provide new useful knowledge of their strongly monotone solutions. The present paper is designed to supplement the pioneering results on the asymptotic analysis of (A) and (B) by means of regular variation developed in the paper [1].

## REFERENCES

- [1] J. Jaroš and T. Kusano, Existence and precise asymptotic behavior of strongly monotone solutions of systems of nonlinear differential equations, *Differ. Equ. Appl.* 5 (2013), 185–204.

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