Structural Identifiability in Julia: A Tutorial

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March 23, 2022

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Outline

- Introduction
- `SIAN.jl`
- `StructuralIdentifiability.jl`
- Examples

Introduction

- Structural identifiability is a theoretical notion
- Global identifiability means we can determine the value of parameter(s) uniquely
- Local identifiability means we can determine up to multiple values

Example

$$\begin{cases} \dot{x} = A^2 x + b, \\ y = x \end{cases} \tag{1}$$

Solution:

- $x(0), b$ are globally identifiable, A is identifiable only locally according to SIAN.
- b is globally identifiable, A is locally identifiable. Note that there is no information about x.

SIAN.jl

- Implements the algorithm from [2].
- Local identifiability is determined via identifiability rank condition
- Global identifiability is analyzed via Gröbner basis

StructuralIdentifiability.jl

- Implements the algorithm form [1]
- Local identifiability is based on the Sedoglavic's algorithm [3].
- Global identifiability is determined via field of coefficients of input-output equations

Examples

Conclusions and Summary