Summary of symmetry calculations

October 6, 2021

Contents

Chapter 1

DBH_model

Run 04_56PM_06_October-2021

Degree in tangential ansätze: 1
The system of ODEs is given by:

$$\begin{aligned}\frac{\mathrm{d}w_1}{\mathrm{d}t} &= -w_1w_2 - w_1w_3 + w_2w_3,\\ \frac{\mathrm{d}w_2}{\mathrm{d}t} &= -w_1w_2 + w_1w_3 - w_2w_3,\\ \frac{\mathrm{d}w_3}{\mathrm{d}t} &= w_1w_2 - w_1w_3 - w_2w_3.\end{aligned}$$

The calculated generators are:

$$\begin{aligned}X_1 &= \left(t^2\right)\partial t + \left(-2tw_1 + 1\right)\partial w_1 + \left(-2tw_2 + 1\right)\partial w_2 + \left(-2tw_3 + 1\right)\partial w_3,\\ &,\\ X_2 &= (1)\,\partial t,\\ &,\\ X_3 &= (-t)\,\partial t + (w_1)\,\partial w_1 + (w_2)\,\partial w_2 + (w_3)\,\partial w_3.\end{aligned}$$

Chapter 2

linear_model

Run 04_50PM_06_October-2021

Degree in tangential ansätze: 1
The system of ODEs is given by:

$$\frac{\mathrm{d}u}{\mathrm{d}t} = u + v,$$
$$\frac{\mathrm{d}v}{\mathrm{d}t} = u + v.$$

The calculated generators are:

$$X_1 = \left(\frac{e^{2t}}{4} - \frac{e^{-2t}}{4}\right)\partial t + \left(\frac{u}{2} - \frac{ue^{-2t}}{2} + \frac{ve^{2t}}{2} - \frac{ve^{-2t}}{2}\right)\partial u + \left(\frac{ve^{2t}}{2} + \frac{v}{2}\right)\partial v,$$

,

$$X_2 = \left(-\frac{e^{2t}}{4} - \frac{1}{2} - \frac{e^{-2t}}{4}\right)\partial t + \left(-\frac{u}{2} - \frac{ue^{-2t}}{2} - \frac{ve^{2t}}{2} - \frac{ve^{-2t}}{2}\right)\partial u + \left(-\frac{ve^{2t}}{2} - \frac{v}{2}\right)\partial v,$$

,

$$X_3 = \left(\frac{e^{2t}}{2} - \frac{1}{2}\right)\partial u + \left(\frac{e^{2t}}{2} + \frac{1}{2}\right)\partial v,$$

,

$$X_4 = \left(-\frac{u}{2} + \frac{ue^{-2t}}{2} + \frac{v}{2} + \frac{ve^{-2t}}{2}\right)\partial t,$$

,

$$X_5 = \left(\frac{e^{2t}}{4} - \frac{1}{2} + \frac{e^{-2t}}{4}\right)\partial t + \left(-\frac{u}{2} + \frac{ue^{-2t}}{2} + \frac{ve^{2t}}{2} + \frac{ve^{-2t}}{2}\right)\partial u + \left(\frac{ve^{2t}}{2} - \frac{v}{2}\right)\partial v,$$

,

$$X_6 = \left(-\frac{e^{2t}}{4} + \frac{e^{-2t}}{4}\right)\partial t + \left(\frac{u}{2} + \frac{ue^{-2t}}{2} - \frac{ve^{2t}}{2} + \frac{ve^{-2t}}{2}\right)\partial u + \left(-\frac{ve^{2t}}{2} + \frac{v}{2}\right)\partial v,$$

,

$$X_7 = (1)\,\partial t,$$

,

$$X_8 = \left(\frac{u}{2} + \frac{ue^{-2t}}{2} - \frac{v}{2} + \frac{ve^{-2t}}{2}\right)\partial t,$$

,

$$X_9 = \left(\frac{e^{2t}}{2} + \frac{1}{2}\right)\partial u + \left(\frac{e^{2t}}{2} - \frac{1}{2}\right)\partial v,$$

,

$$X_{10} = (\mathrm{f}_1(t))\,\partial t + ((u+v)\,\mathrm{f}_1(t))\,\partial u + ((u+v)\,\mathrm{f}_1(t))\,\partial v.$$

Some of the generators might contain the following arbitrary functions:

$$\mathrm{f}_1$$

Chapter 3

hydons_model

Run 04_50PM_06_October-2021

Degree in tangential ansätze: 1
The system of ODEs is given by:

$$\begin{aligned}\frac{\mathrm{d}y_1}{\mathrm{d}t} &= \frac{ty_1 + y_2^2}{-t^2 + y_1 y_2},\\ \frac{\mathrm{d}y_2}{\mathrm{d}t} &= \frac{ty_2 + y_1^2}{-t^2 + y_1 y_2}.\end{aligned}$$

The calculated generators are:

$$X_1 = (t)\,\partial t + (y_1)\,\partial y_1 + (y_2)\,\partial y_2.$$