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$$\begin{aligned}
\dot{x}_1 &= p_1 z - k_{15} x_1 \\
\dot{x}_2 &= p_2 z - k_{25} x_2 \\
\dot{x}_3 &= p_3 z - k_{35} x_3 \\
\dot{x}_4 &= p_4 z - k_{46} x_4 \\
\dot{x}_5 &= k_{15} x_1 + k_{25} x_2 + k_{35} x_3 - k_{50} x_5 - k_{56} x_5 \\
\dot{x}_6 &= k_{46} x_4 + k_{56} x_5 - k_{60} x_6 - k_{67} x_6 \\
\dot{x}_7 &= k_{67} x_6 - k_{70} x_7
\end{aligned}$$

Tab. 2: The Model Variables

1 Introduction

1.1 Historical Context

2 The Carbon Cycle Problem

2.1 Modelling Approach

2.1.1 Variables

p_i	Flow portion from atmosphere to i
k_{ij}	Flow portion from i to j

Tab. 1: The Model Variables

2.1.2 Differential Equations

$$\begin{pmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \\ \dot{x}_4 \\ \dot{x}_5 \\ \dot{x}_6 \\ \dot{x}_7 \end{pmatrix} = \begin{bmatrix} -k_{15} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -k_{25} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -k_{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -k_{46} & 0 & 0 & 0 \\ k_{15} & k_{25} & k_{35} & 0 & -k_{50} - k_{56} & 0 & 0 \\ 0 & 0 & 0 & k_{46} & k_{56} & -k_{60} - k_{67} & 0 \\ 0 & 0 & 0 & 0 & 0 & k_{67} & -k_{70} \end{bmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \\ x_7 \end{pmatrix} +$$

$$\begin{bmatrix} p_1 z \\ p_2 z \\ p_3 z \\ p_4 z \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

2.2 Solving the Model

2.3 Sensitivity Analysis

3 Conclusion

4 Appendix A