kBLOCKS Package

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I. INTRODUCTION

Welcome to the demo documentation of kBLOCKS. Desiring to typeset control block diagrams in \LaTeX{} and dissatisfied with the other \LaTeX{} macro packages that can be found online, I thought: why not write my own macro package for this purpose.

I wish to start with the question, “What is kBLOCKS?” The kBLOCKS macro package is the product of using TikZ/PGF to directly typeset beautiful control block diagrams and signal flow graphs in my Masters’ dissertation and papers directly with \LaTeX{}. Basically, it just defines a dedicated “kblock” environment and a number of macro commands to make drawing control block diagrams using TikZ/PGF more structured and easier. In a sense, when you use kBLOCKS you program or typeset graphics for control block diagrams, just as you “program” graphics in your document when you use \LaTeX{} using TikZ/PGF.

The powerful options offered by TikZ/PGF often intimidates beginner users not ready to spend careful time learning about TikZ/PGF. Like all \LaTeX{} packages, TikZ/PGF inherits the steep learning curve of \LaTeX{}, that is, no what you see is what you get. The kBLOCKS macro reduces the length of this learning curve, by focusing the graphics theme on control block diagrams only. Fortunately this documentation as it grows and gets to be improved, will come with a number of slowly-paced tutorials, which will guide you on creating control block diagrams with kBLOCKS without your having to read the TikZ/PGF manual.

My wish is that you do find it useful and helpful. Please, don’t forget to share and like if you did.

I will readily welcome any e-mails for improvement or suggestion with respect to using kBLOCKS and making it useful for researchers, students and others involved in the applications and field of control theory.

II. DEMOS

A.

\begin{verbatim}
\begin{block}
  \StartNode[Sr$] (R1)
  \PlusMinusDown (R1) S1 \{0cm\}
  \TFRight[0cm] S1 B1 \{1\{s\}\}
  \MarkNodeRight[0cm] B1 N1
  \OutRight N1 Y1 \{y\} \{0cm\}
  \LinkVHHVAbove[0cm] S1 N1 S1 \{0\} \{0\}
  \LinkVHHVBelow[0cm] S1 N1 S1 \{0\} \{0\}
  \Link{} R1 S1
  \Link[e] S1 B1
  \Linkn{} B1 N1
\end{block}
\end{verbatim}

B.

\begin{verbatim}
\begin{block}
  \StartNode[Sr$] (R1)
  \PlusMinusDown (R1) S1 \{0cm\}
  \TFRight[0cm] S1 B1 \{1\{s\}\}
  \MarkNodeRight[0cm] B1 N1
  \OutRight N1 Y1 \{y\} \{0cm\}
  \LinkVHHVAbove[0cm] S1 N1 S1 \{0\} \{0\}
  \LinkVHHVBelow[0cm] S1 N1 S1 \{0\} \{0\}
  \Link{} R1 S1
  \Link[e] S1 B1
  \Linkn{} B1 N1
\end{block}
\end{verbatim}

Closed-loop system
C.\begin{figure*}[ht]
\begin{center}
\includegraphics[width=0.5\textwidth]{fig_c}
\end{center}
\end{figure*}
\begin{align*}
\text{PID model} & \rightarrow \text{PID controller} \\
\text{PID controller} & \rightarrow \text{process}
\end{align*}

D.\begin{figure*}[ht]
\begin{center}
\includegraphics[width=0.5\textwidth]{fig_d}
\end{center}
\end{figure*}
\begin{align*}
\text{PID model} & \rightarrow \text{PID controller} \\
\text{PID controller} & \rightarrow \text{process}
\end{align*}
The image contains two pages of code and text. Here is the plain text representation:

**Page 1:**

\begin{verbatim}
\begin{block}
  \kjumpcs{(R)}{(0.0,0)}
  \kjumpcss{Right}{-0.5cm}{R}{CR}{0}{3}
  \kjumpcss{Left}{-0.5cm}{R}{CR}{0}{9}
  \kjumpcss{Above}{-0.5cm}{R}{CR}{0}{12}
  \kjumpcss{Below}{-0.5cm}{R}{CR}{0}{6}
  \kTFbelow{(R)}{(C1)}{\textbf{series}{\text{PID}\(\cdot\)}}{\text{bm}({\text{\(\cdot\)\)}}{\text{bm}({\text{\(\cdot\)\)}}}
  \kScaleDistX{0.67}
  \kTFbelow{(P1)}{\text{bm}({\text{\(\cdot\)\)}}{\text{bm}({\text{\(\cdot\)\)}}}
  \kScaleDistX{1}
  \kilnleft{(0cm)}{(C1)}{(RI)}{(w)}{0.1}
  \kMarkNodeLeft{(0cm)}{(P1)}{(ON)}
  \kLink{(P1)}{[ON]}
  \kOutLeft{(0.5cm)}{(ON)}{(z)}{0}
  \kLinkVH{(z)}{(C1)}{\text{west}}{-0.1}
  \kOutRight{(0cm)}{(P1)}{(Z)}{0.1}
  \kOutRight{(0cm)}{(C1)}{(V)}{0.1}
  \kCoverRect{blue}{0.5cm}{(P1)}{0.1cm}{0.1cm}{0.2cm}{0.2cm}
  \kCoverTextAbove{(0cm)}{(0cm)}{(TX1)}{Physical System}
  \kCoverRect{red}{0.5cm}{(C1)}{0.1cm}{0.1cm}{0.2cm}{0.2cm}
  \kCoverTextBelow{(0cm)}{(0cm)}{(TX2)}{Computing System}
\end{block}
\end{verbatim}

**Page 2:**

\begin{verbatim}
\begin{block}
  \kjumpcs{(R)}{(0.0,0)}
  \kjumpcss{Right}{-0.5cm}{R}{CR}{0}{3}
  \kjumpcss{Left}{-0.5cm}{R}{CR}{0}{9}
  \kjumpcss{Above}{-0.5cm}{R}{CR}{0}{12}
  \kjumpcss{Below}{-0.5cm}{R}{CR}{0}{6}
  \kTFbelow{(R)}{(C1)}{\textbf{series}{\text{PID}\(\cdot\)}}{\text{bm}({\text{\(\cdot\)\)}}{\text{bm}({\text{\(\cdot\)\)}}}
  \kScaleDistX{0.67}
  \kTFbelow{(P1)}{\text{bm}({\text{\(\cdot\)\)}}{\text{bm}({\text{\(\cdot\)\)}}}
  \kScaleDistX{1}
  \kilnleft{(0cm)}{(C1)}{(RI)}{(w)}{0.1}
  \kMarkNodeLeft{(0cm)}{(P1)}{(ON)}
  \kLink{(P1)}{[ON]}
  \kOutLeft{(0.5cm)}{(ON)}{(z)}{0}
  \kLinkVH{(z)}{(C1)}{\text{west}}{-0.1}
  \kOutRight{(0cm)}{(P1)}{(Z)}{0.1}
  \kOutRight{(0cm)}{(C1)}{(V)}{0.1}
  \kCoverRect{blue}{0.5cm}{(P1)}{0.1cm}{0.1cm}{0.2cm}{0.2cm}
  \kCoverTextAbove{(0cm)}{(0cm)}{(TX1)}{Physical System}
  \kCoverRect{red}{0.5cm}{(C1)}{0.1cm}{0.1cm}{0.2cm}{0.2cm}
  \kCoverTextBelow{(0cm)}{(0cm)}{(TX2)}{Computing System}
\end{block}
\end{verbatim}
\begin{block}
\text{kJumpCS}(0,0)
\end{block}
\begin{block}
\text{kJumpCSLeft}(-0.5cm)(j1)(0)(j0)
\end{block}
\begin{block}
\text{kCoverRect}[\text{blue}](j1)(2cm)(2cm)(2cm)(2cm)
\end{block}
\end{block}