```latex
\documentclass[10pt]{article}
\usepackage{setspace}
\usepackage{amsmath,amsfonts,amsthm,amssymb}
\usepackage{color}
\usepackage{fancyhdr}
\usepackage{chngpage}
\usepackage{enumerate}
\usepackage{graphicx}
\usepackage{boxedminipage}

\title{The Euler-Lagrangian of the Ein Concept \LaTeX}
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\begin{document}
\doublespacing
\footnotesize
\maketitle
\date

\abstract{Using the Denavit-Hartenberg Parameters the Lagrangian of Ein was Calculat
ed to be L}

\section{Question: The Lagrangian}
\subsection{question about the lagrangian}
when i take the derivative of the lagrangian w/ respect to q
do i take the derivative of each q?
and are the dependent on one another?
if i differentiate $q_{1}q_{2}$ with respect to $q_{1}$ what do i get?

\begin{equation}
M_{i} =
\begin{bmatrix}
m_{i} & 0 & 0 \\
0 & m_{i} & 0 \\
0 & 0 & m_{i} \\
\end{bmatrix}
\end{equation}

\begin{equation}
I_{b,i} =
\begin{bmatrix}
I_{x} & 0 & 0 \\
0 & I_{y} & 0 \\
0 & 0 & I_{z} \\
\end{bmatrix}
\end{equation}



\begin{equation}
L & = & K & - & P
\end{equation}

\begin{equation}
K & = & \frac{M_{i}V_{i}^{2}}{2} =
\frac{1}{2}\dot{q^{T}}\left[\sum\limits_{i=1}^{n} M_{i}J_{v,i}^{T}J_{v,i} + \\
J_{\omega,i}^{T}R_{i}I_{b,i}R_{i}^{T}J_{\omega,i}\right]\dot{q}
\end{equation}

\begin{equation}
J_{i} =
\begin{bmatrix}
J_{v,i} \\
J_{\omega,i}\\
\end{bmatrix}
=
\begin{bmatrix}
J_{v_{0}} & J_{v_{1}} & \dots & J_{v_{n}} \\
J_{\omega_{0}} & J_{\omega_{1}} & \dots & J_{\omega_{n}}
\end{bmatrix}
\end{equation}

\begin{equation}
P & = & M_{i}gh\\
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= \sum\limits_{i=1}^{n} \vec{g}^{T} M_{i} \vec{r}_{c,i}
\end{equation}


\section{Results}

\subsection{Denavit-Hartenberg Parameters}
\begin{center}
\begin{tabular}{| 1 | p{1cm} | p{1cm} | p{1cm} | p{1cm} |}
\hline
Link_{i} & a_{i} & $\alpha_{i}$ & d_{i} & $\theta_{i}$ \\ \hline
1 & 0 & $\frac{\pi}{2}$ & L_{t} & $\theta_{t}$ \\ \hline
2 & 0 & 0 & L_{s} & 0 \\ \hline
\end{tabular}
\end{center}

\subsection{Jacobian}

\subsubsection{Jacobian of Link One's Center of Mass}
\begin{equation}
J_{1} =
\left[\begin{matrix}
0.5 l_{1} \sin{\left (q_{1} \right )} & 0\\
- 0.5 l_{1} \cos{\left (q_{1} \right )} & 0\\
0 & 0\\
0 & 0\\
0 & 0\\
1 & 0
\end{matrix}\right]
\end{equation}

\subsubsection{Jacobian of Link Two's Center of Mass}
\begin{equation}
J_{2} =
\left[\begin{matrix}
0 & 1.0 \sin{\left (q_{1} \right )}\\
0 & - 1.0 \cos{\left (q_{1} \right )}\\
1 & 6.12323399573677 \cdot 10^{-17}\\
0 & 0\\
0 & 0\\
0 & 0
\end{matrix}\right]
\end{equation}

\subsection{Lagrangian Results}
\begin{equation}
\begin{align}
L  &= 0.5 g l_{1} m_{1} \sin{\left (q_{1} \right )} + g m_{2} \left(0.5 l_{2}\nonumb
er\\
&\qquad + 1.0 q_{2}\right) \cos{\left (q_{1} \right )} + 0.5 m_{2} \dot{q}_{2} \left
(6.12323399573677 \cdot 10^{-17} \dot{q}_{1}\nonumber\\
&\qquad + 1.0 \dot{q}_{2}\right) + 0.5 \dot{q}_{1} \left(6.12323399573677 \cdot 10^{
-17} m_{2} \dot{q}_{2}\nonumber\\
&\qquad + \dot{q}_{1} \left(0.25 l_{1}^{2} m_{1} + 1.04719755119713 m_{1} r_{1}^{2}\
nonumber\\
&\qquad + 1.0 m_{2}\right)\right)
\end{align}
\end{equation}

\subsection{Torque: Derived from the Lagrangian}
\begin{equation}
\begin{align}
\tau_{k} &= - 0.5 g l_{1} m_{1} \cos{\left (q_{1} \right )} + g m_{2} \left(0.5 l_{2
}\nonumber\\
&\qquad + 1.0 q_{2}\right) \sin{\left (q_{1} \right )} - 1.0 g m_{2} \cos{\left (q_{
1} \right )}\nonumber\\
&\qquad + 1.0 m_{2} \ddot{q}_{2} + \ddot{q}_{1} \left(0.25 l_{1}^{2} m_{1}\nonumber\
\
&\qquad + 1.04719755119713 m_{1} r_{1}^{2} + 1.0 m_{2}\right)
\end{align}
\end{equation}

\end{document}
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