**Given:** A force \( \vec{F} \) along the line connecting points \( A \) and \( B \).

**Required:** The moment due to \( \vec{F} \) along the edge \( CD \). Use Matlab for all calculations.

Outline General Solution Steps

1. Put \( \vec{F} \) into Cartesian vector form.
   Calculate a position vector from \( A \) to \( B \).
   Divide the position vector from \( A \) to \( B \) by its magnitude to get a unit vector.
   Multiply the unit vector pointing from \( A \) to \( B \) by the magnitude of \( \vec{F} \).
2. Calculate a position vector from any point on the line containing \( C \) and \( D \) to any point on the l.o.a of \( \vec{F} \) (i.e., the line containing \( A \) and \( B \)).
3. Using the position vector calculated in step 2 and the cross product, calculate the moment due to \( \vec{F} \).
4. Calculate a unit vector that points from \( C \) to \( D \).
   Calculate a position vector from \( C \) to \( D \).
   Divide the position vector from \( C \) to \( D \) by its magnitude to get a unit vector.
5. Using the unit vector calculated in step 4, the moment calculated in step 3, and the dot product, calculate the projection of moment due to \( \vec{F} \) onto the line \( CD \).
First Solution Details

Get the coordinates of $A$, $B$, $C$, and $D$.

\[
A = [6.5 \ 1.5 \ 0] \text{ ft} \quad B = [6.5 \ -1 \ 3] \text{ ft} \\
C = [6 \ 7 \ 1] \text{ ft} \quad D = [-1.5 \ 5 \ 2] \text{ ft}
\]

\[
\mathbf{r}_{AB} = \mathbf{r}_B - \mathbf{r}_A = B - A = [0 \ -2.5 \ 3] \text{ ft}
\]

\[
\hat{n}_{AB} = \frac{\mathbf{r}_{AB}}{|\mathbf{r}_{AB}|} = [0 \ -0.6402 \ 0.7682]
\]

\[
\mathbf{F} = F \hat{n}_{AB} = [0 \ -128 \ 153.6] \text{ lb}
\]

\[
\mathbf{r}_{CD} = \mathbf{r}_C - \mathbf{r}_D = C - D = [0.5 \ -5.5 \ -1] \text{ ft}
\]

\[
\mathbf{M}_c = \mathbf{r}_{ca} \times \mathbf{F} = [-973 \ -76.8 \ -64] \text{ ft} \cdot \text{lb}
\]

\[
M_{CD} = \mathbf{M}_c \cdot \hat{n}_{CD} = +943.97 \text{ ft} \cdot \text{lb}
\]

Second Solution Details

Get the coordinates of $A$, $B$, $C$, and $D$.

\[
A = [6.5 \ 1.5 \ 0] \text{ ft} \quad B = [6.5 \ -1 \ 3] \text{ ft} \\
C = [6 \ 7 \ 1] \text{ ft} \quad D = [-1.5 \ 5 \ 2] \text{ ft}
\]

\[
\mathbf{r}_{AB} = \mathbf{r}_B - \mathbf{r}_A = B - A = [0 \ -2.5 \ 3] \text{ ft}
\]

\[
\hat{n}_{AB} = \frac{\mathbf{r}_{AB}}{|\mathbf{r}_{AB}|} = [0 \ -0.6402 \ 0.7682]
\]

\[
\mathbf{F} = F \hat{n}_{AB} = [0 \ -128 \ 153.6] \text{ lb}
\]

\[
\mathbf{r}_{CD} = \mathbf{r}_C - \mathbf{r}_D = C - D = [8 \ -6 \ 1] \text{ ft}
\]

\[
\mathbf{M}_d = \mathbf{r}_{da} \times \mathbf{F} = [-794 \ -1223 \ -1024] \text{ ft} \cdot \text{lb}
\]

\[
M_{CD} = \mathbf{M}_d \cdot \hat{n}_{CD} = +943.97 \text{ ft} \cdot \text{lb}
\]