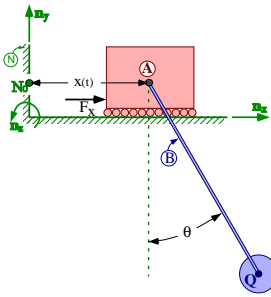


### 22.6.4 MG road-map: Bridge crane equations of motion



A payload (particle)  $Q$  is attached to the end of a light rigid cable  $B$  which swings in a Newtonian reference frame  $N$ . Cable  $B$  is connected to a massive trolley  $A$  (modeled as a particle). Trolley  $A$  moves horizontally along a smooth slot fixed in  $N$  with a **specified** (known) displacement  $x(t)$  due to a force of measure  $F_x$  (a linear actuator connects  $A$  to a point  $N_o$  of  $N$ ). All motion is in a vertical plane perpendicular to the unit vector  $\hat{n}_z$  fixed in  $N$ .

Complete the **MG road-map** for  $B$ 's "pendulum angle"  $\theta$  and the actuator force  $F_x$  required to translate  $A$  with specified displacement  $x(t)$ .

Variable	Translate/ Rotate	Direction (unit vector)	System $S$	FBD of $S$	About point*	<b>MG road-map equation</b> equation
$\theta$	<input type="text"/>	<input type="text"/>	<input type="text"/>	<b>Draw</b>	<input type="text"/>	<input type="text"/>
$F_x$	<input type="text"/>	<input type="text"/>	<input type="text"/>	<b>Draw</b>	Not applicable	<input type="text"/>
$\theta$	Dot	( <input type="text"/> , <input type="text"/> )	System( <input type="text"/> )	.GetDynamics( <input type="text"/> )		<b>MotionGenesis</b> command ©
$F_x$	Dot	( <input type="text"/> , <input type="text"/> )	System( <input type="text"/> )	.GetDynamics( )		<b>MotionGenesis</b> command ©

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