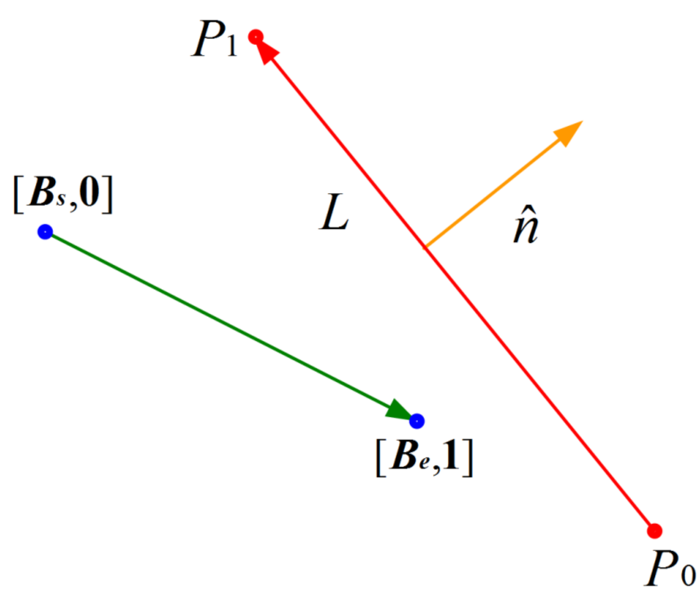
METHOD 2

METHOD 2
Test for Non-Collision (1/4)

$$\text{Ball modeled as} : \boldsymbol{B}(\boldsymbol{t}) = \boldsymbol{B}_s + \vec{\boldsymbol{v}}\boldsymbol{t}$$, where vector V = B_sB_e

$$\text{Wall modeled as } \boldsymbol{L}\text{:}\hat{\boldsymbol{n}} \bullet \boldsymbol{P} - \hat{\boldsymbol{n}} \bullet \boldsymbol{P}_0 = \boldsymbol{0}$$

$$(\hat{\boldsymbol{n}} \bullet \boldsymbol{B}_s < \hat{\boldsymbol{n}} \bullet \boldsymbol{P}_0) \,\&\&\, (\hat{\boldsymbol{n}} \bullet \boldsymbol{B}_e < \hat{\boldsymbol{n}} \bullet \boldsymbol{P}_0)$$

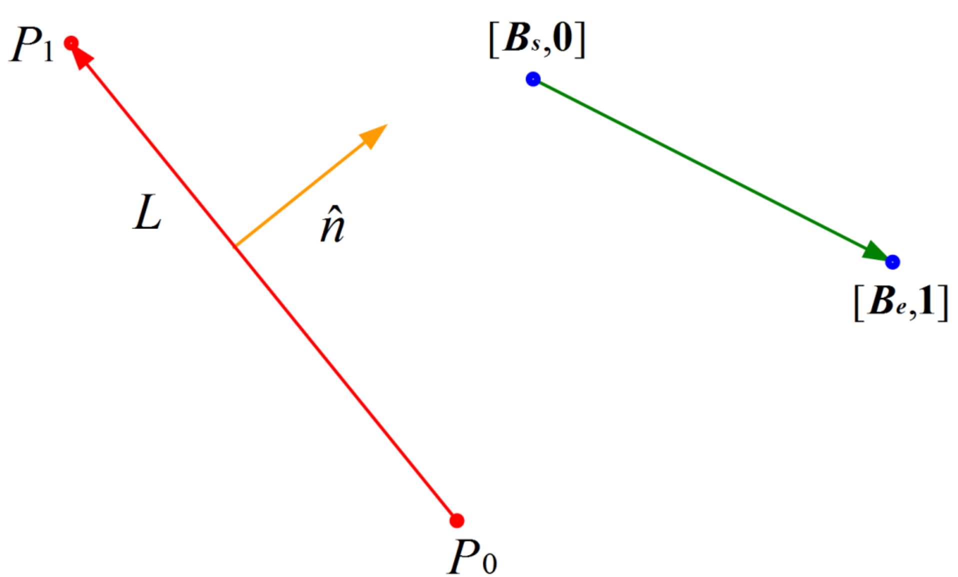


METHOD 2
Test for Non-Collision (2/4)

$$\text{Ball modeled as}: \boldsymbol{B}(\boldsymbol{t}) = \boldsymbol{B}_s + \vec{\boldsymbol{v}}\boldsymbol{t}$$

$$\text{Wall modeled as } \boldsymbol{L}{:}\,\hat{\boldsymbol{n}} \bullet \boldsymbol{P} - \hat{\boldsymbol{n}} \bullet \boldsymbol{P}_0 = \boldsymbol{0}$$

$$(\hat{\boldsymbol{n}} \bullet \boldsymbol{B}_s > \hat{\boldsymbol{n}} \bullet \boldsymbol{P}_0) \,\&\&\, (\hat{\boldsymbol{n}} \bullet \boldsymbol{B}_e > \hat{\boldsymbol{n}} \bullet \boldsymbol{P}_0)$$

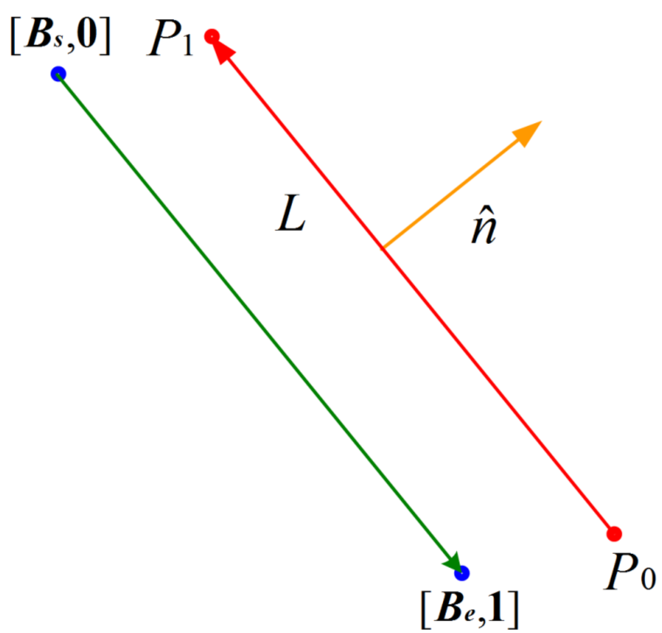


METHOD 2
Test for Non-Collision (3/4)

$$\text{Ball modeled as}: \boldsymbol{B}(\boldsymbol{t}) = \boldsymbol{B}_s + \vec{\boldsymbol{v}}\boldsymbol{t}$$

$$\text{Wall modeled as } \boldsymbol{L}{:}\,\hat{\boldsymbol{n}} \bullet \boldsymbol{P} - \hat{\boldsymbol{n}} \bullet \boldsymbol{P}_0 = \boldsymbol{0}$$

$$\hat{\boldsymbol{n}} \bullet \vec{\boldsymbol{v}} = \boldsymbol{0}$$



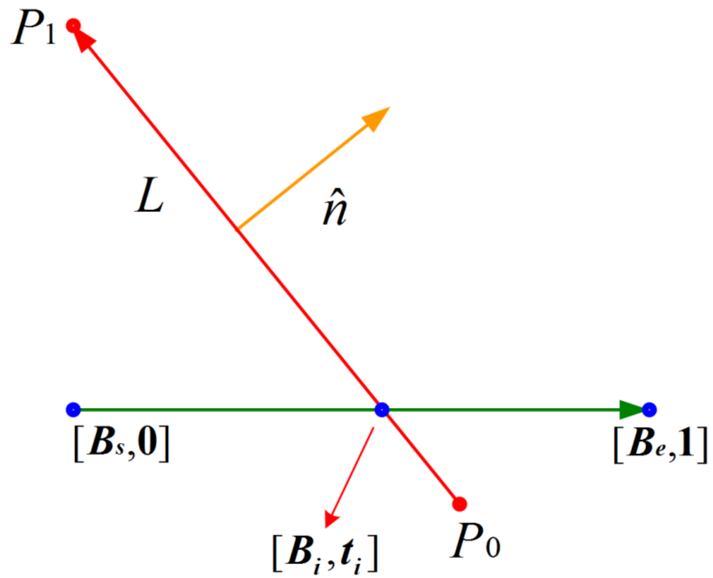
METHOD 2
Compute ratio of collision with Wall

Ball modeled as : $\boldsymbol{B(t) = B_s + \vec{v}t}$

Wall modeled as $\boldsymbol{L: \hat{n} \bullet P - \hat{n} \bullet P_0 = 0}$

$$\boldsymbol{t_i = \frac{\hat{n} \bullet P_0 - \hat{n} \bullet B_s}{\hat{n} \bullet \vec{v}}} \text{ and } \boldsymbol{t_i \in [0,1]}$$

$$\boldsymbol{B_i = B_s + \vec{v}\left(\frac{\hat{n} \bullet P_0 - \hat{n} \bullet B_s}{\hat{n} \bullet \vec{v}}\right)}$$

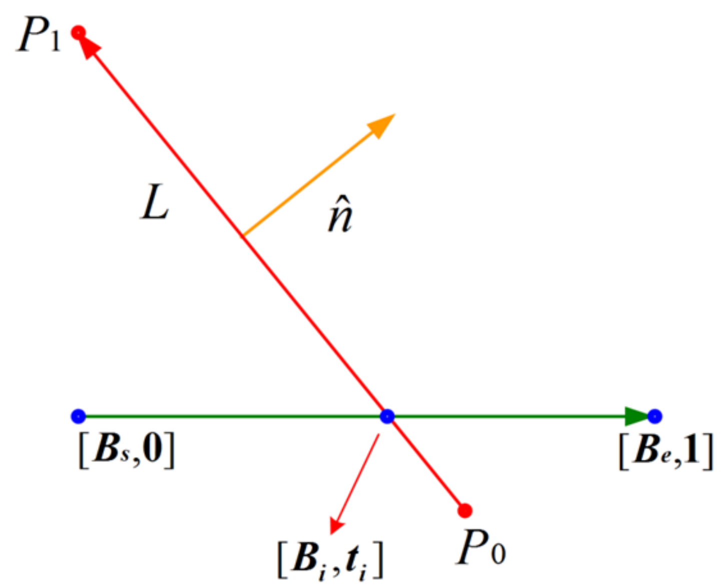


METHOD 2
Test for Non-Collision (4/4)

Ball modeled as : $\boldsymbol{B}(\boldsymbol{t}) = \boldsymbol{B}_s + \vec{\boldsymbol{v}}\boldsymbol{t}$

Wall modeled as $\boldsymbol{L}: \hat{\boldsymbol{n}} \bullet \boldsymbol{P} - \hat{\boldsymbol{n}} \bullet \boldsymbol{P}_0 = \boldsymbol{0}$

$$(\boldsymbol{B}_i - \boldsymbol{P}_0) \bullet (\boldsymbol{B}_i - \boldsymbol{P}_1) < \boldsymbol{0}$$



- Ball collides with infinite extension of wall … from inside wall!
- If the dot product is non-negative, B_i will be a point of intersection outside the boundaries of P_0P_1

METHOD 3

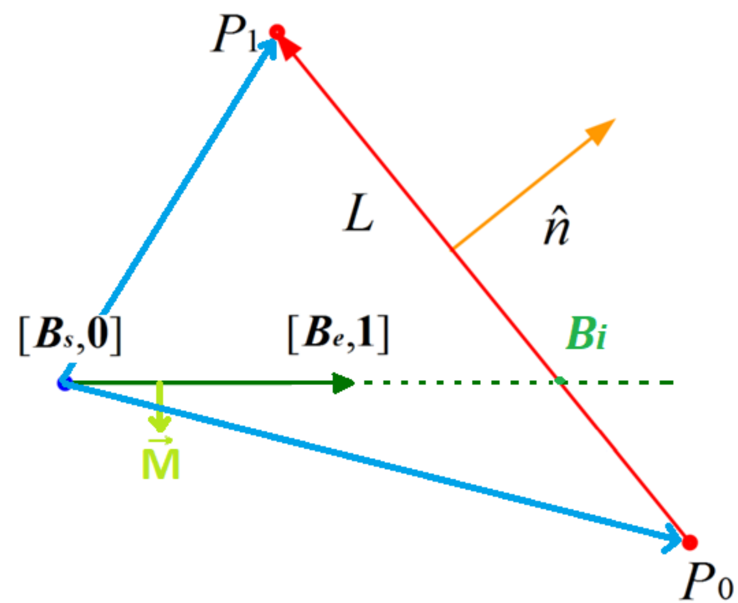
METHOD 3

Test for vector B_sB_e extended line, if cutting P_0P_1 line segment

Ball modeled as : $B(t) = B_s + \vec{v}t$

Wall modeled as $L: \hat{n} \bullet P - \hat{n} \bullet P_0 = 0$

$(B_sP_0 \bullet \vec{M}) \times (B_sP_1 \bullet \vec{M}) <= 0$



- Ball collides with infinite extension of wall … from inside wall!
- B_i may be a point of intersection inside the boundaries of P_0P_1

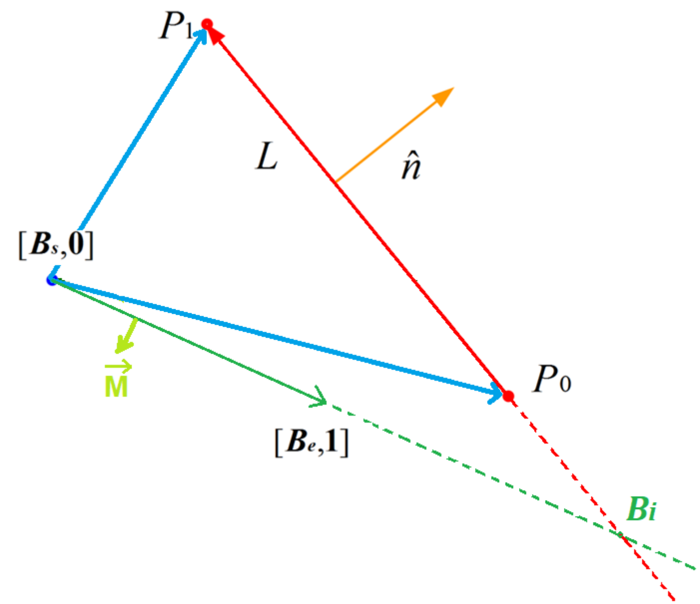
METHOD 3

If the dot product is non-negative, B_i will be a point of intersection outside the boundaries of P_0P_1

Ball modeled as: $\boldsymbol{B(t) = B_s + \vec{v}t}$

Wall modeled as $\boldsymbol{L: \hat{n} \bullet P - \hat{n} \bullet P_0 = 0}$

$$(B_sP_0 \bullet \vec{M}) \times (B_sP_1 \bullet \vec{M}) > 0$$



- Stop and return no collision

METHOD 3
Compute ratio of collision with Wall

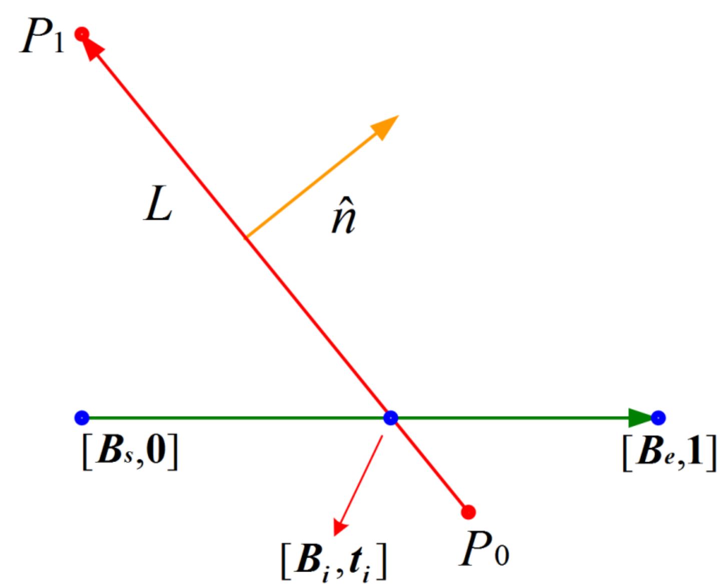
Ball modeled as : $\boldsymbol{B(t) = B_s + \vec{v}t}$

Wall modeled as $\boldsymbol{L: \hat{n} \bullet P - \hat{n} \bullet P_0 = 0}$

if: $(B_sP_0 \bullet \vec{M}) \times (B_sP_1 \bullet \vec{M}) <= 0$

$$\boldsymbol{t_i = \frac{\hat{n} \bullet P_0 - \hat{n} \bullet B_s}{\hat{n} \bullet \vec{v}}} \text{ and } \boldsymbol{t_i \in [0,1]}$$

$$\boldsymbol{B_i = B_s + \vec{v}\left(\frac{\hat{n} \bullet P_0 - \hat{n} \bullet B_s}{\hat{n} \bullet \vec{v}}\right)}$$



Reference

- Check "*Animated Point to Line - 3 Methods Pseudo Code.pdf*" file for pseudo-code steps.