Pose Graph

David Arnon

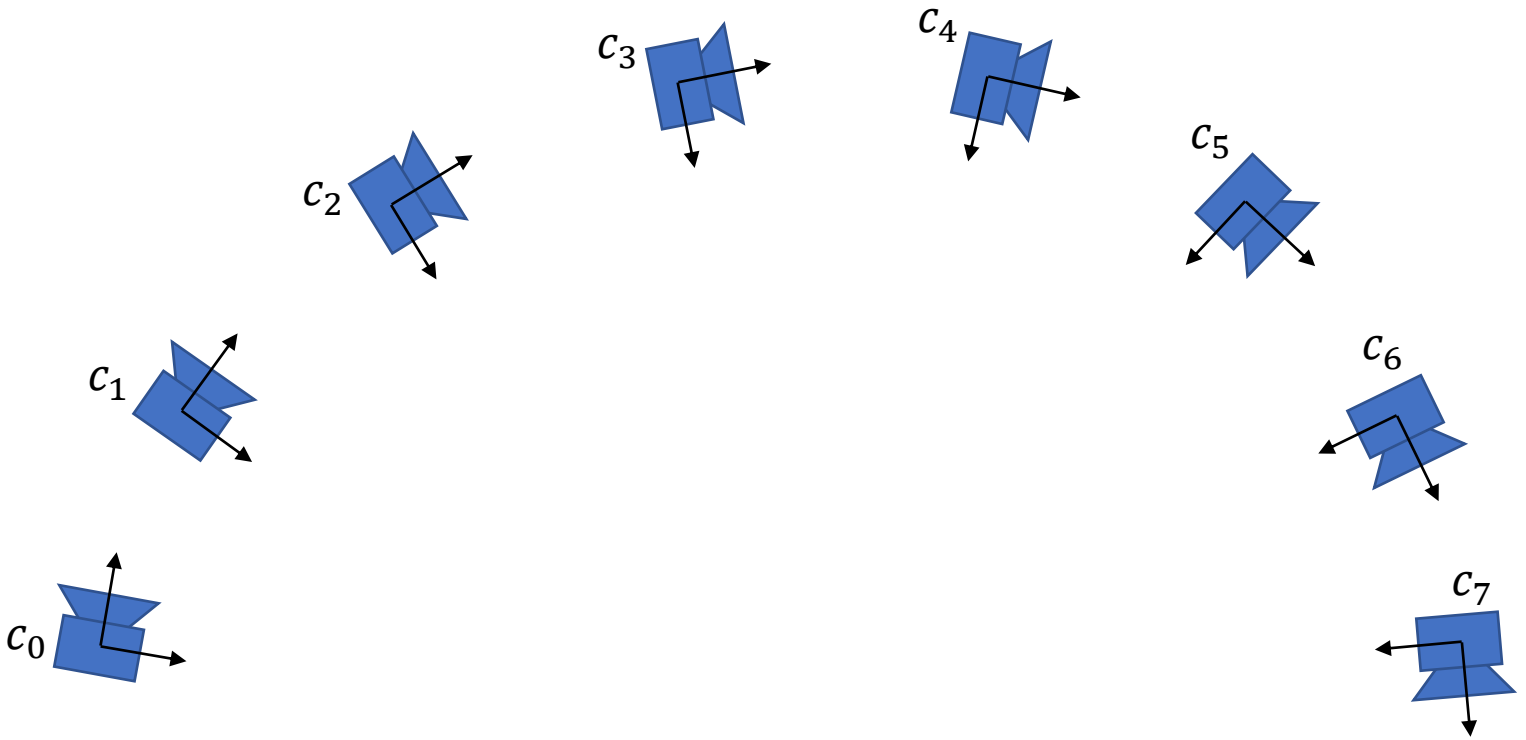
Relative Nonlinear Factor

- `relative_pose = pose_c0.between(pose_c1)`
- $c_0 = [R_0|t_0], \quad c_1 = [R_1|t_1]$ ⟵ *camera to world*
- $R_0 \underbrace{(R_\Delta x + t_\Delta)}_{c_1 \to c_0} + t_0 = R_1 x + t_1$
- $R_\Delta = R_0^T R_1$
- $t_\Delta = R_0^T (t_1 - t_0)$

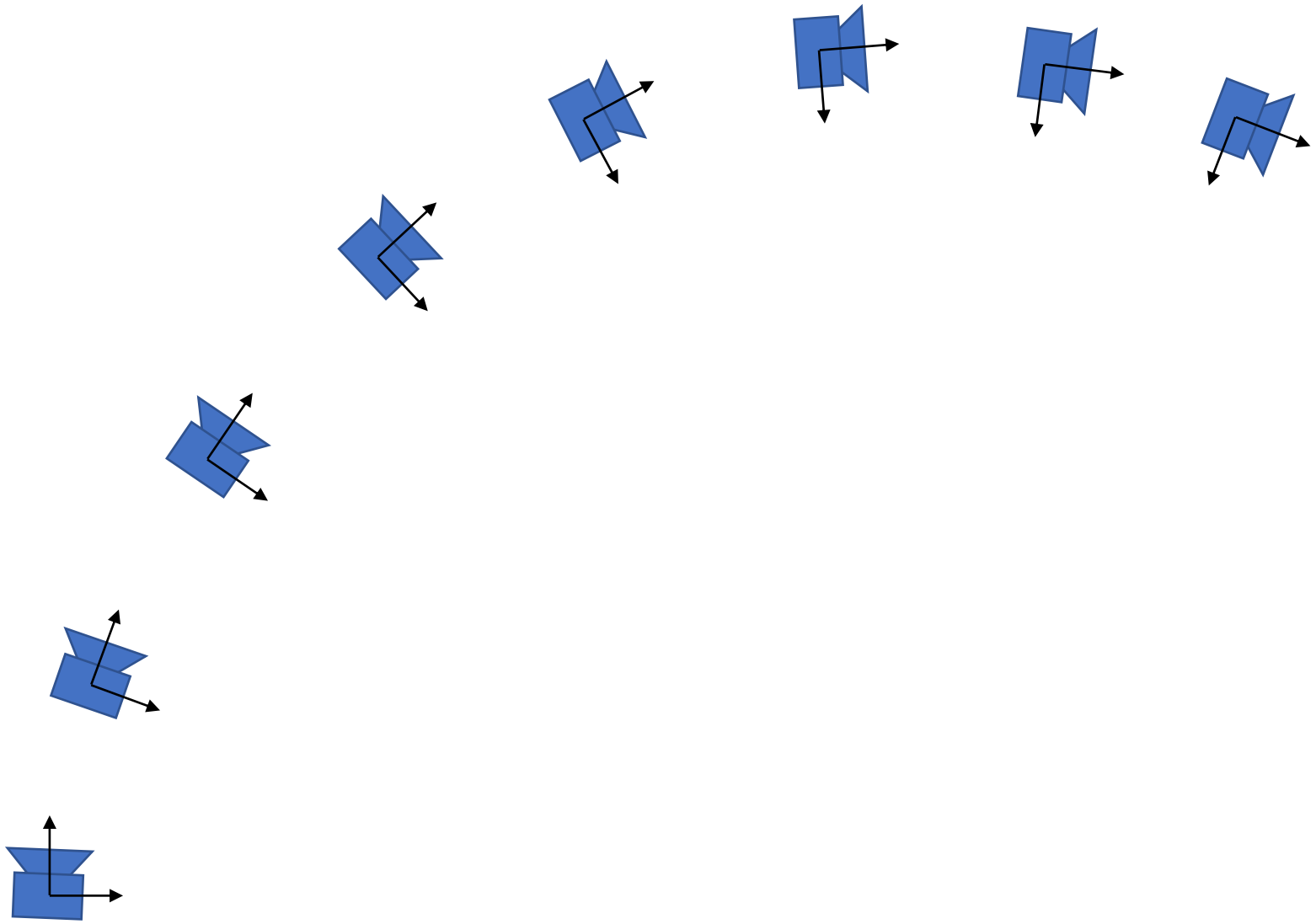
```
Class between(const Class& g) const {
  return derived().inverse() * g;
}
```

- `BetweenFactorPose3(c0, c1, relative_pose, noiseCov)`

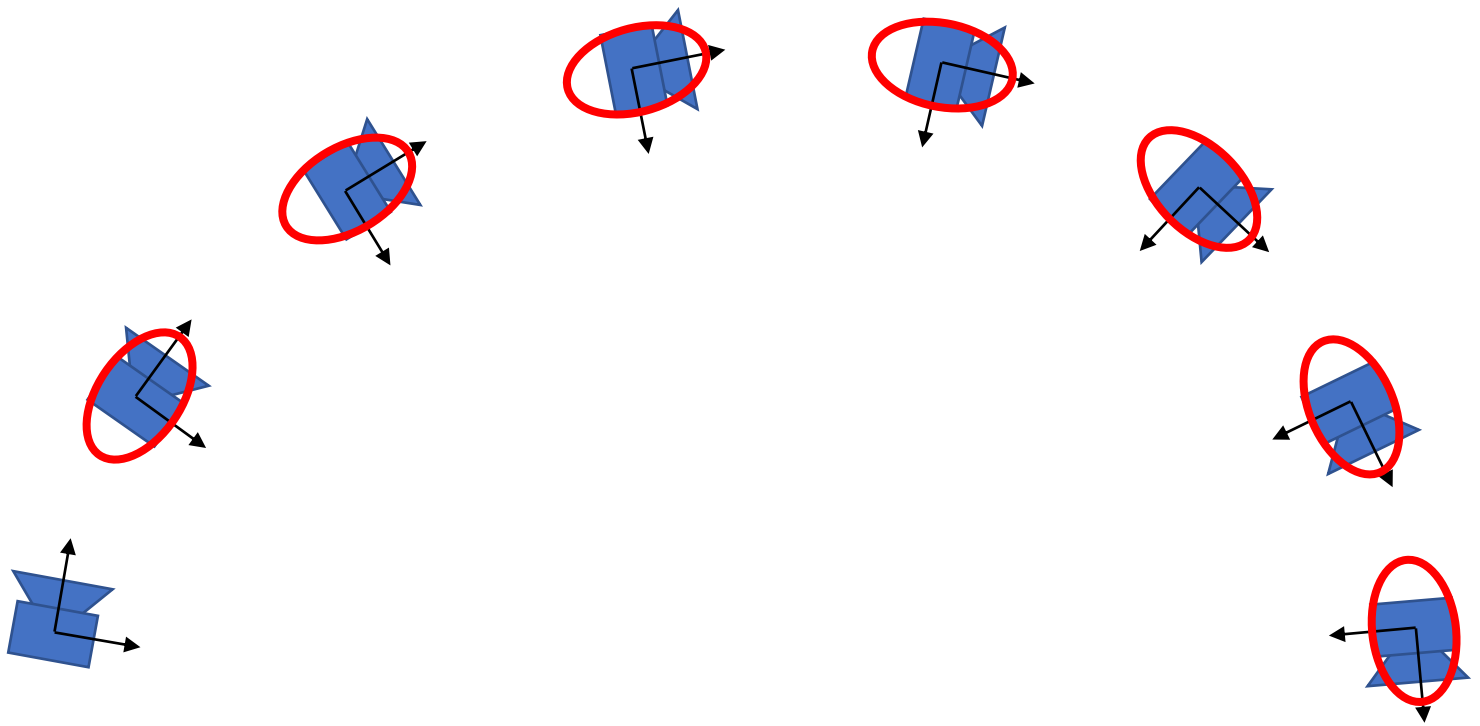
Estimation Error



Estimation Error



Absolute Error

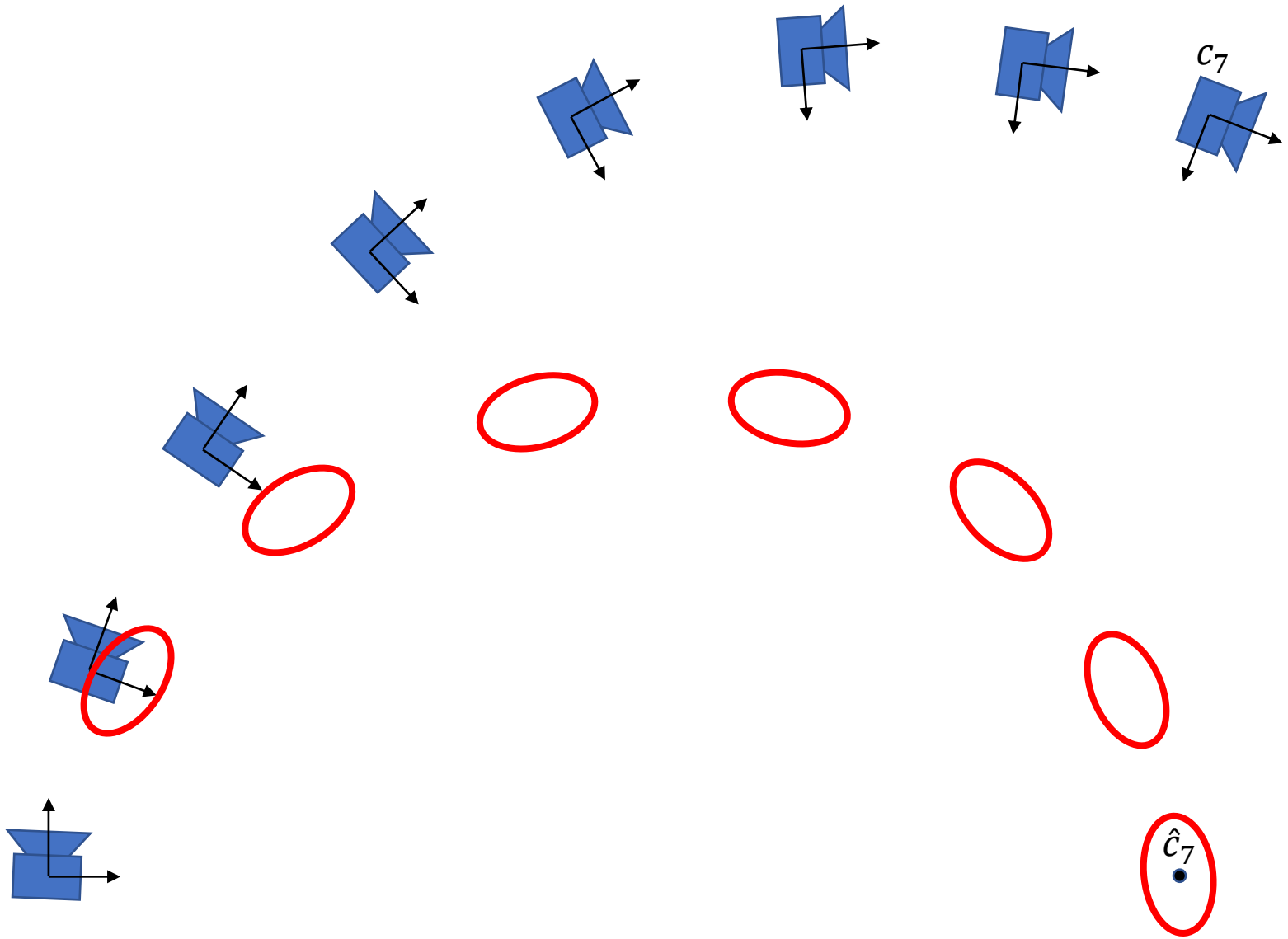


$$c_1 \stackrel{!}{=} \hat{c}_1$$

$$\vdots$$

$$c_7 \stackrel{!}{=} \hat{c}_7$$

Absolute Error

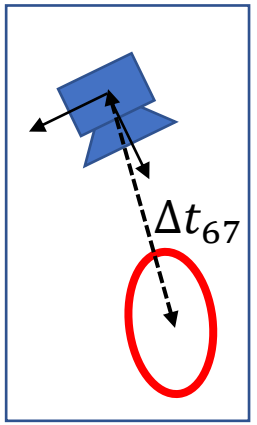


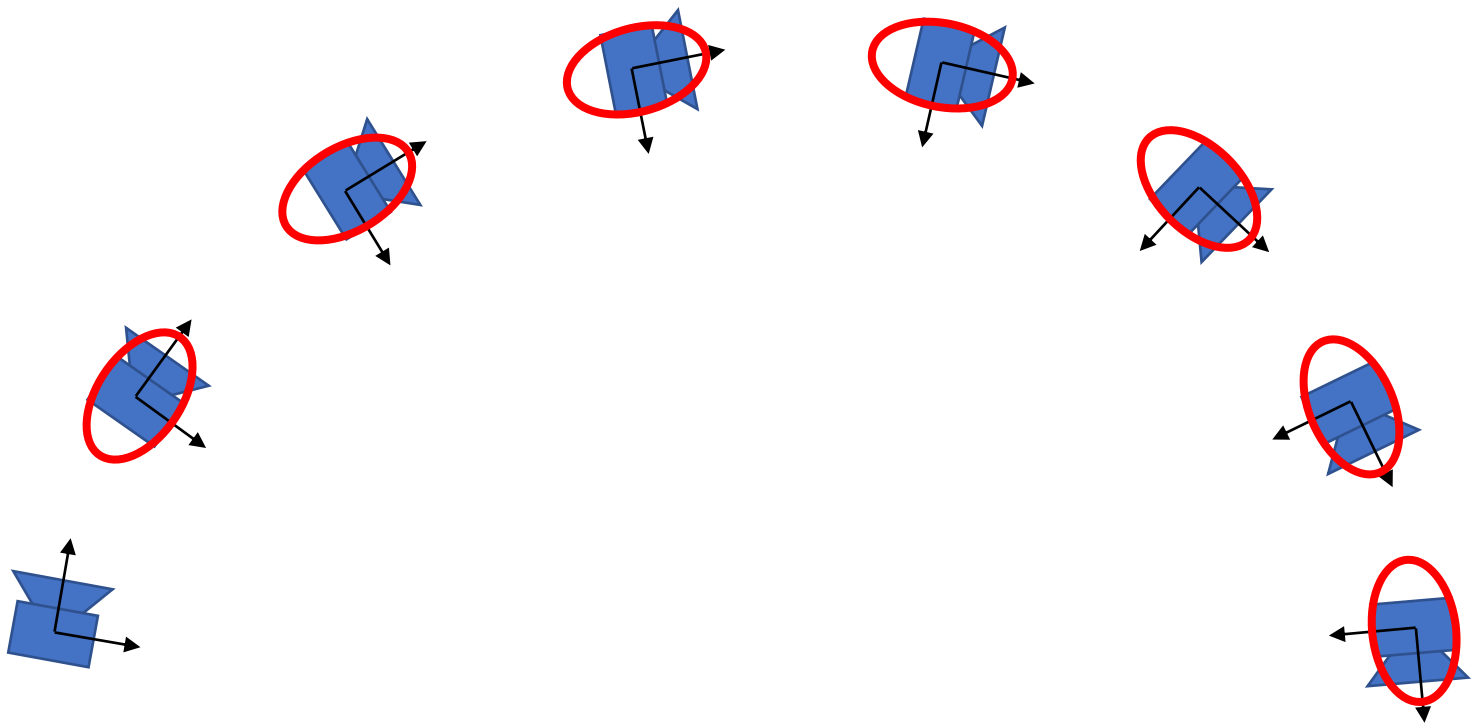
$$c_1 \stackrel{!}{=} \hat{c}_1$$

$$\vdots$$

$$c_7 \stackrel{!}{=} \hat{c}_7$$

Relative Error



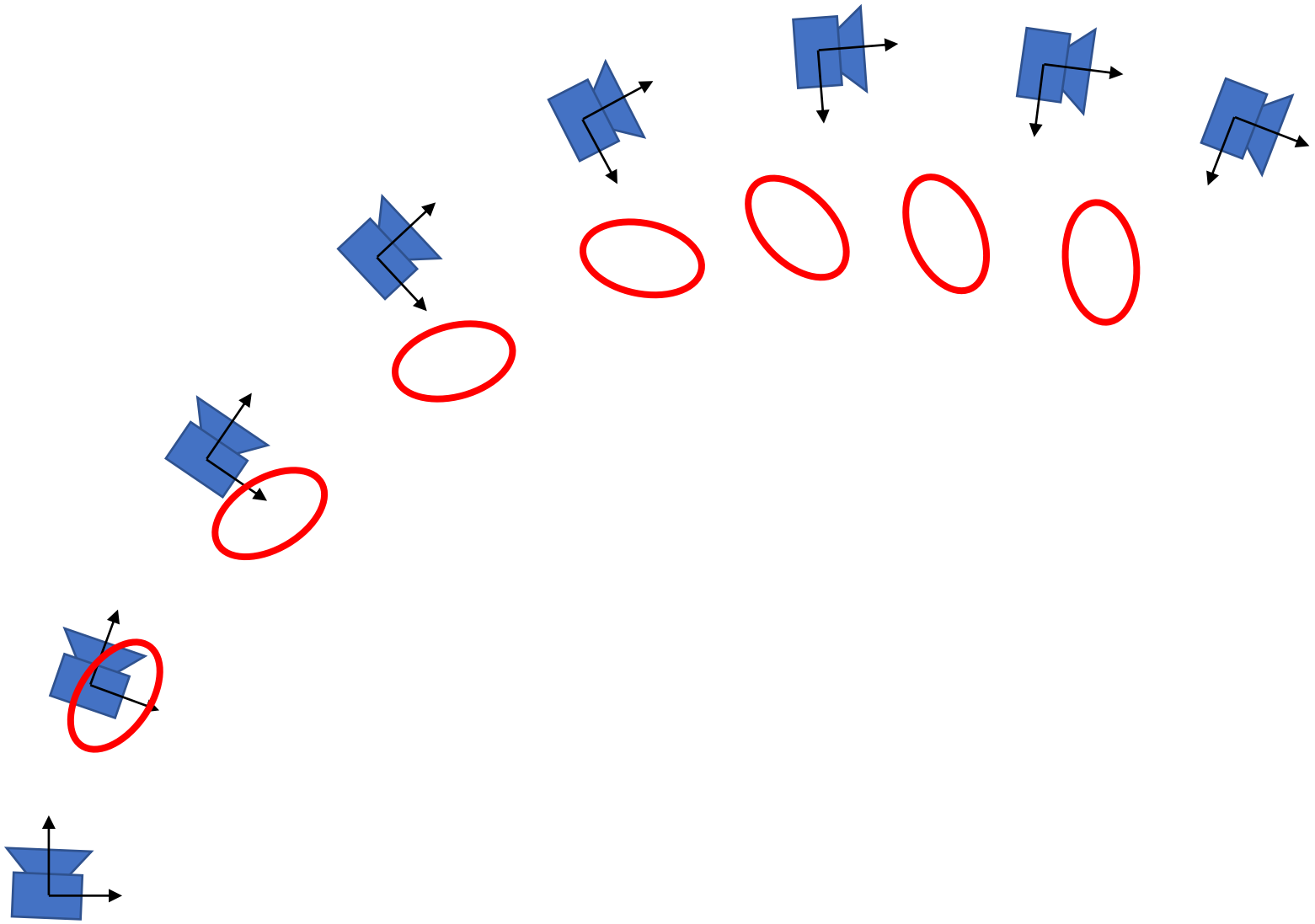


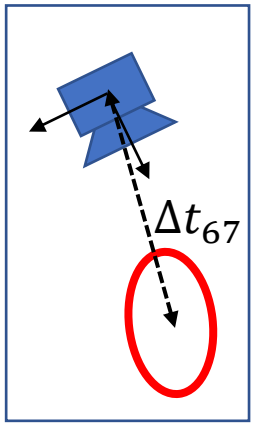
$$t_1 - t_0 \stackrel{!}{=} \Delta t_{01}$$

$$\vdots$$

$$t_7 - t_6 \stackrel{!}{=} \Delta t_{67}$$

Relative Error





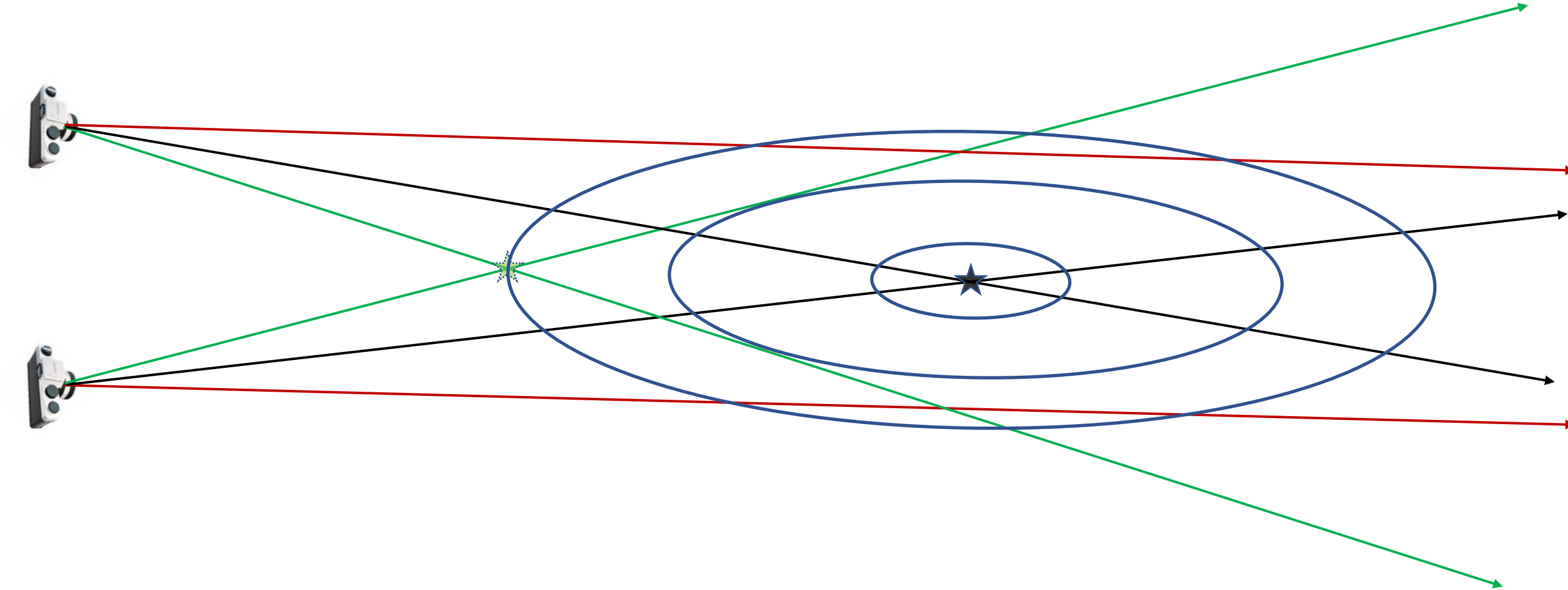
$$t_1 - t_0 \stackrel{!}{=} \Delta t_{01}$$

$$\vdots$$

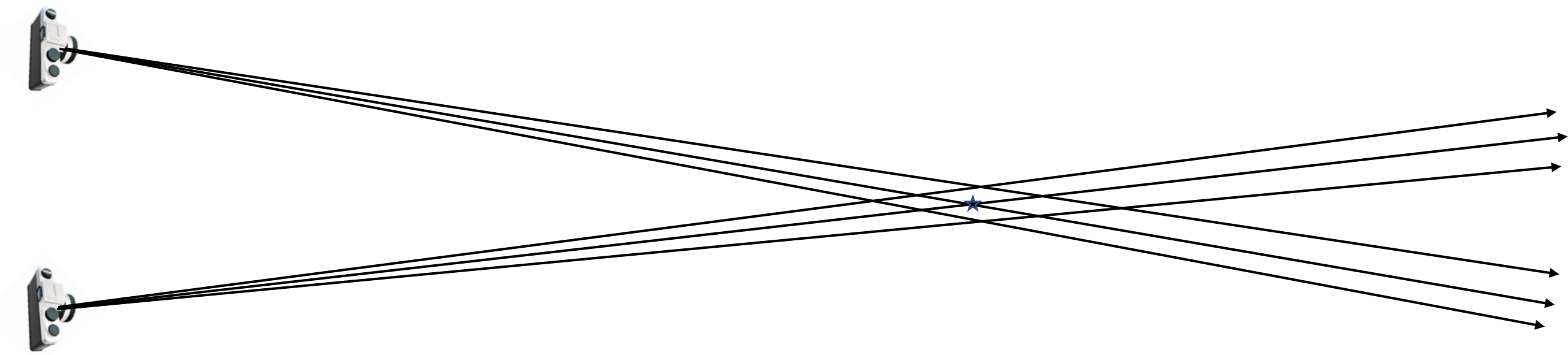
$$t_7 - t_6 \stackrel{!}{=} \Delta t_{67}$$

Gaussian

Linear Approximation



Gaussian
Linear Approximation

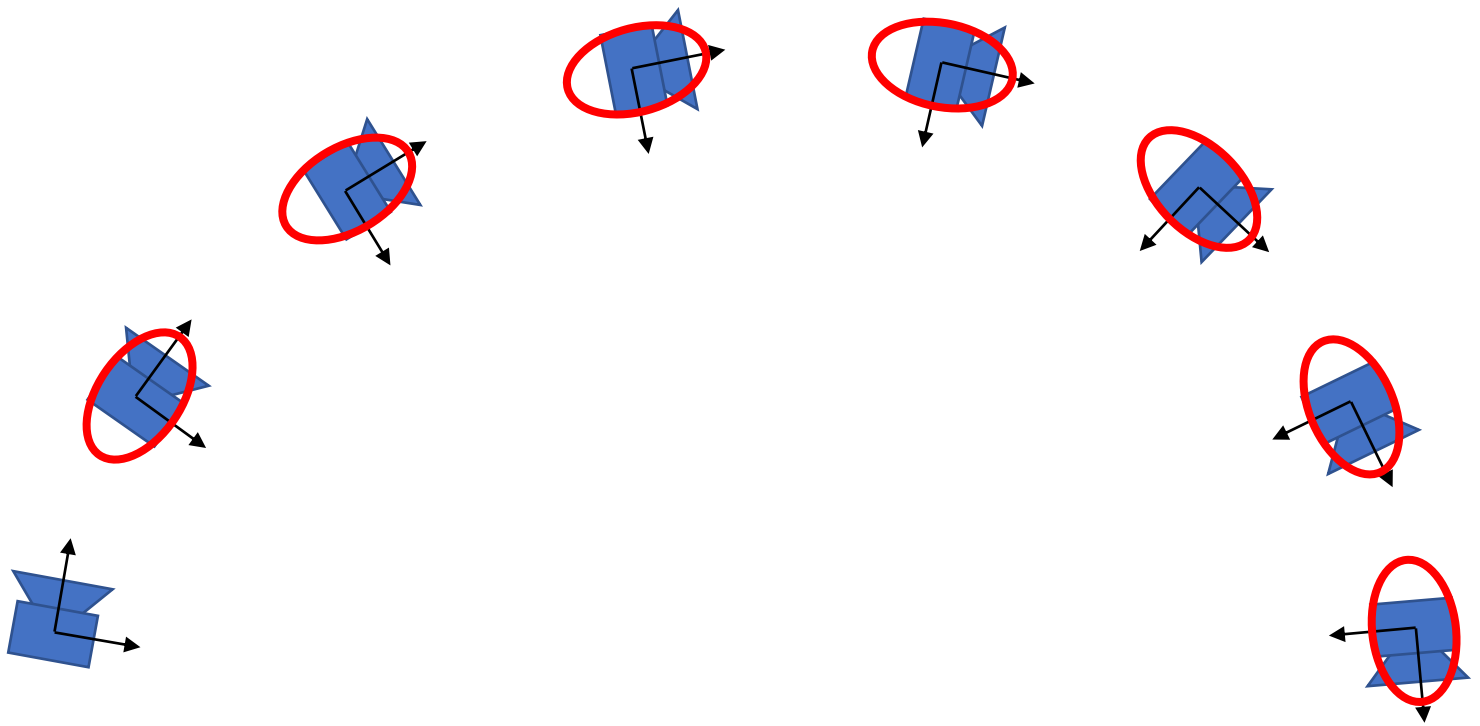


Relative POV Error

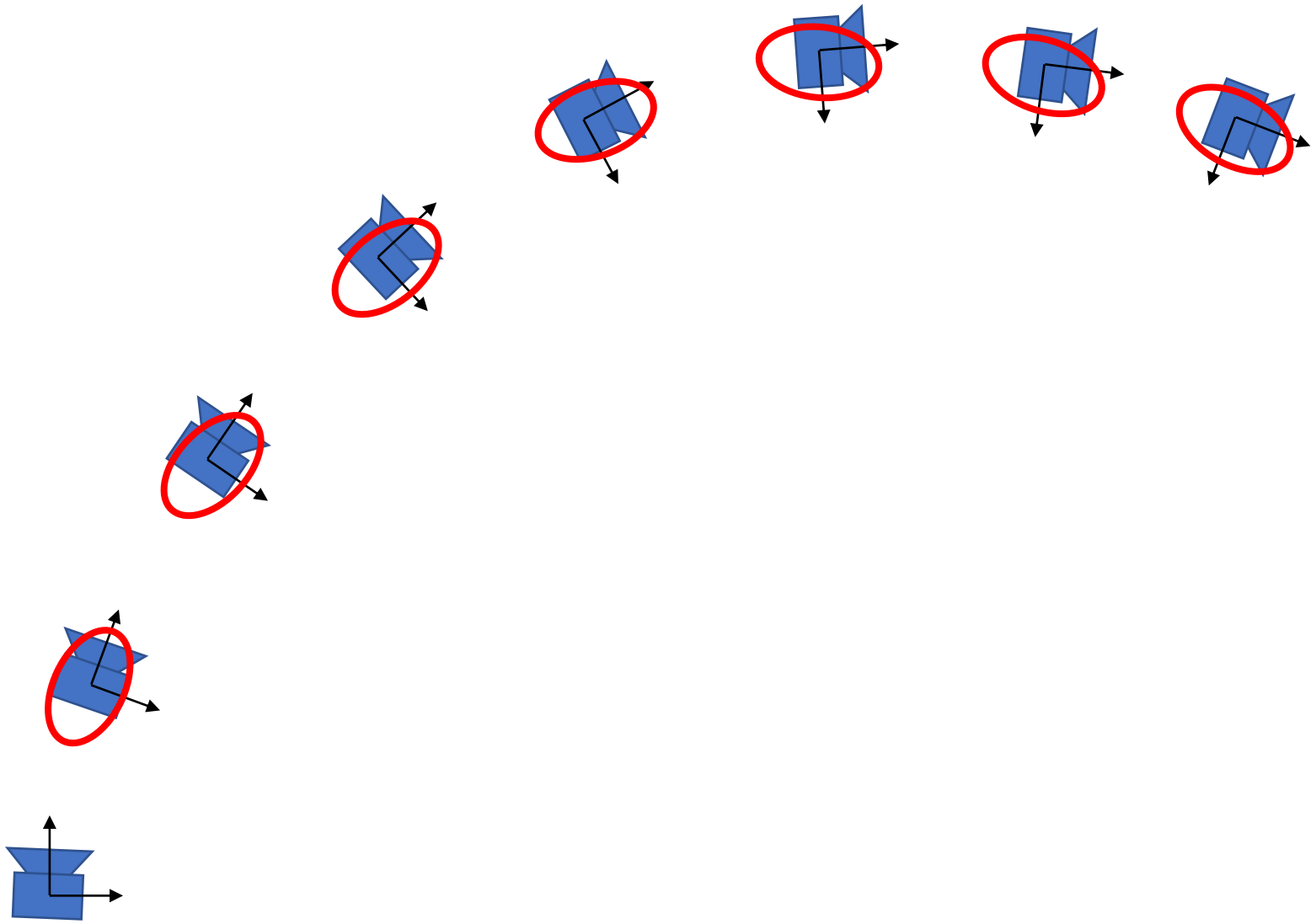
$$\Delta t_{01} \stackrel{!}{=} R_0^T(t_1 - t_0)$$

$$\vdots$$

$$\Delta t_{67} \stackrel{!}{=} R_6^T(t_7 - t_6)$$



Relative Nonlinear Error



$$\Delta t_{01} \stackrel{!}{=} R_0^T(t_1 - t_0)$$

$$\vdots$$

$$\Delta t_{67} \stackrel{!}{=} R_6^T(t_7 - t_6)$$