Real time simulation: Continuum Robot Manipulator

segment
Continuum Joint ①

segment
Continuum Joint ②
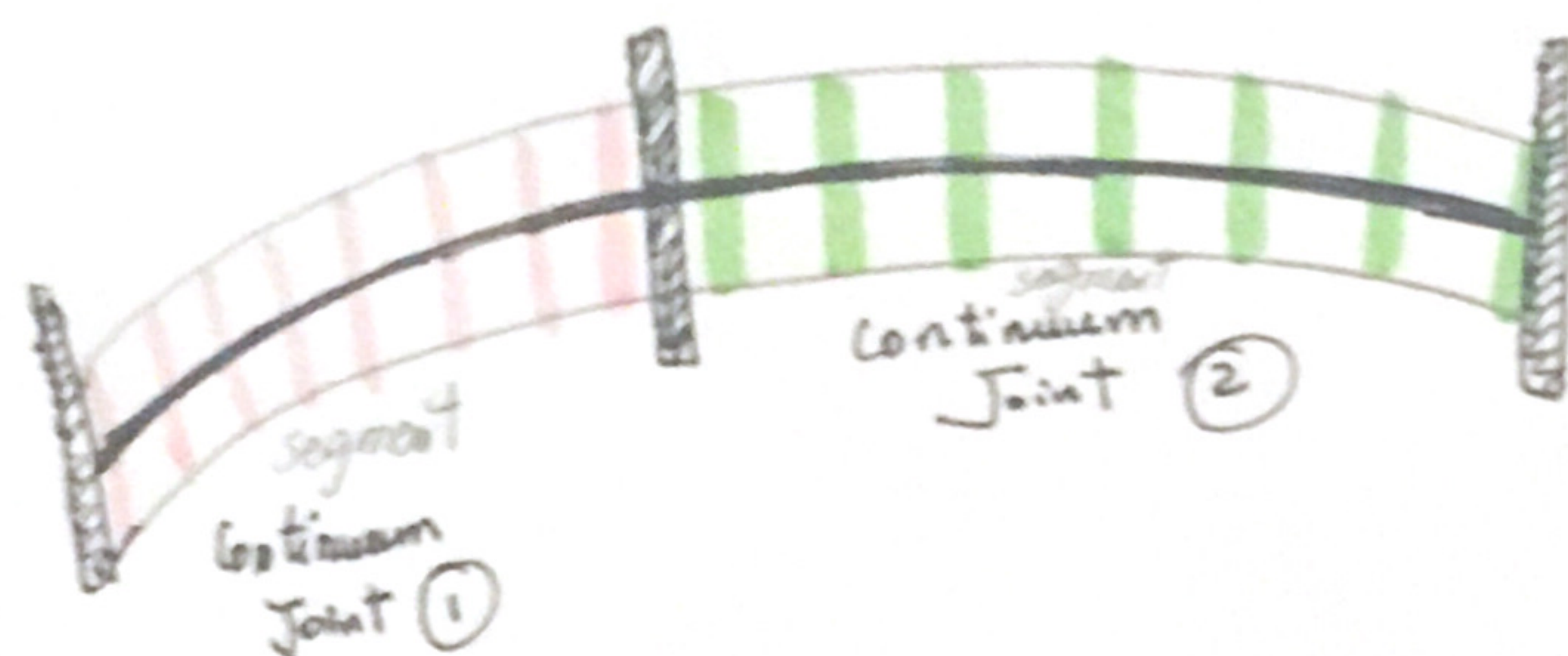
↓ Kinematics and actuation Methodology

$\ell + \Delta x$

ℓ

$\ell - \Delta x$

d

- Planar bending : one of the simplest
  cases "bending for a
  compliant beam
  structure.

- Curvature of the beam has the same
  value along the central axis of the robotic
  arc segment.

- the bended segment can be approximated
  as a segment of a string

- when the arm is bended with an angle of θ_x → the length of
the inner tendon ② is decreased with Δx then: $\boxed{\ell_i = \ell - \Delta x}$
and for the outer tendon ① we can write also: $\boxed{\ell_o = \ell + \Delta x}$
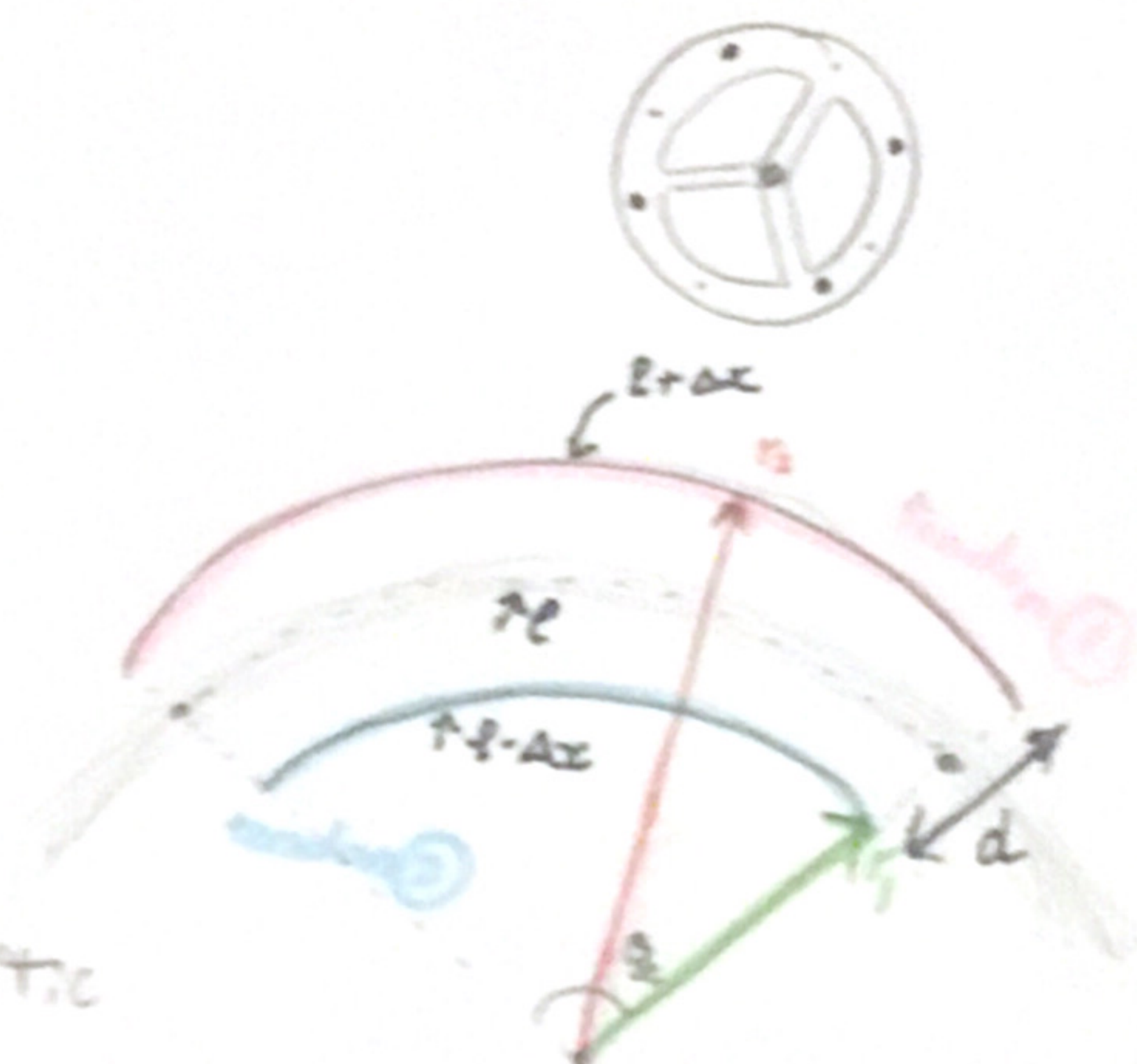
↳ with the CC ⟹ $\begin{cases} \ell - \Delta x = r_i \theta_x \quad (*) \\ \ell + \Delta x = r_2 \theta_x \quad (* \ *) \end{cases}$ → $\theta_x = \dfrac{2 \Delta x}{d} \quad (* \ * \ *)$

- Δx : displacement of the tendon
  Pair
- d : distance btw 2 antagonistic
  tendons