

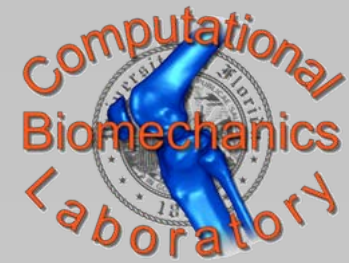
Lecture 19

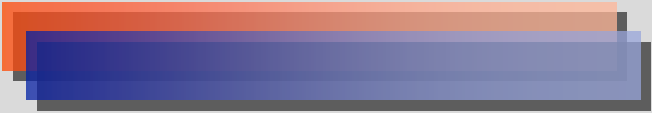
Muscle Wrapping

EML 5595
Mechanics of the Human Locomotor System

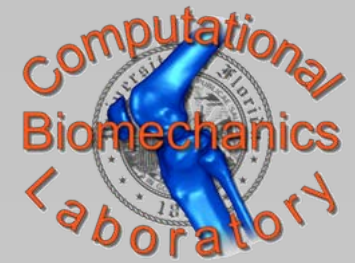


Outline



- Motivation
 - General Methods
 - Journal Article Reviews
 - Garner and Pandy (2000)
 - Charlton and Johnson (2001)
 - SIMM Implementation
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Outline

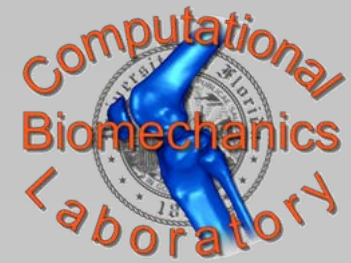


- Motivation

Why Wrapping Algorithms?

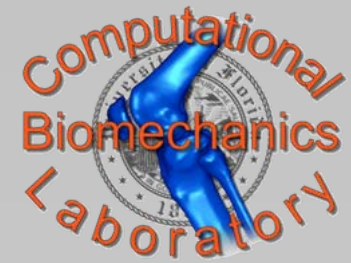
- In real life, muscles do not follow straight line paths from origin to insertion.
- In real life, muscles can wrap over other muscles or bones.
- Incorrect muscle wrapping results in incorrect muscle moment arms and muscle tendon lengths, which in turn affect dynamic simulations via their affect on predicted muscle torques and forces.

Outline



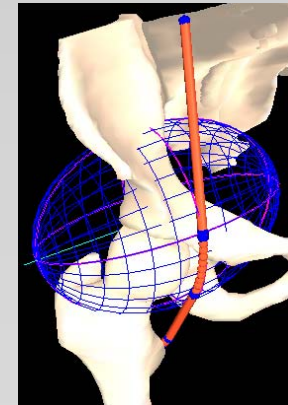
- Motivation
- **General Methods**

Overview



Three general methods have been used to make muscles wrap around other muscles and bones:

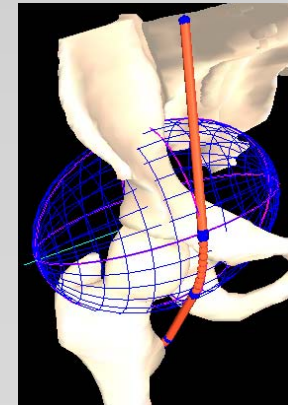
- Effective origins and insertions
- Conditional via points
- Interactive wrapping surfaces



Issues

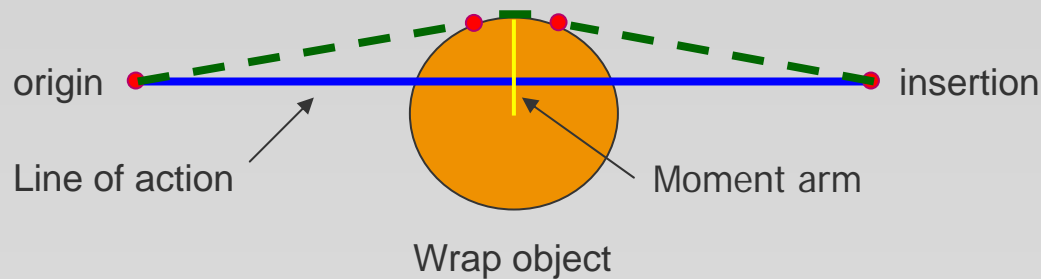
What potential problems can we have with each of these three methods?

- Effective origins and insertions
- Conditional via points
- Interactive wrapping surfaces

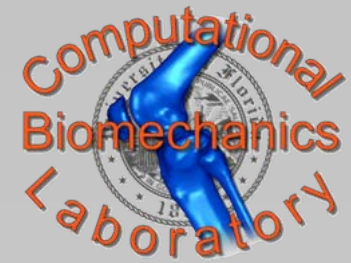


Wrapping Surfaces

- Goal – find the shortest path from muscle origin to insertion around the wrapping object.
- Check to see if the muscle is passing through the object. If so, add 2 via points tangent to the wrapping object.

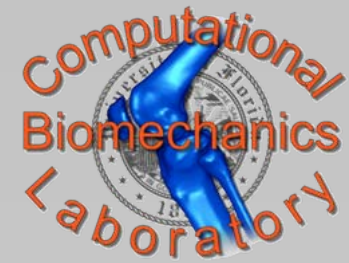


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- Motivation
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Charlton and Johnson (2001)
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Wrapping Surfaces



- Why do Garner and Pandy (2000) and Charlton and Johnson (2001) use objects like spheres and cylinders for wrapping surfaces?
- How does Garner and Pandy's method differ from Charlton and Johnson's method?
- How does SIMM implement wrapping surfaces?