Lacrosse Throw Model: Experienced vs. Inexperienced Form

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Many types of lacrosse stick components giving almost innumerable combinations

Ball velocity affected by multiple factors
  - Hand positioning
  - Head shape, offset
  - Mesh
  - Stringing

Typical lacrosse shot/throw much like baseball pitch/throw
RATIONALE AND GOALS

- Curiosity
- Accepted throwing method is well known
- More to have a framework to improve upon

Specific Goals
- Show the difference in throwing styles
- Provide a basic model for a lacrosse throw that can be improved upon later
  - Muscles
  - More DOF’s
MODEL – DEVELOPMENT

- Started with Arm26 example
  - One arm!
- Searched for previous work
- Found full body model by Menegolo
  - Too complicated
  - No masses
- Decided to expand Arm26 using parts from complicated model
MODEL – DEVELOPMENT

- First tried to copy right arm
  - Gave basic .osim construction
- Copied left arm geometry files from full body model
  - Had to manually place clavicle, scapula, ulna, radius
  - Hand bones were grouped in elbow
- Attempted using Rapid Form software to mirror left arm
  - Acquired the ulna and radius
- Used Paraview for the hand
- Stick comprised of cylinder.vtp and box.vtp
MODEL – COMPLETION

- Created two models: one for each throwing form
- Estimated joint angles for each starting and ending position
- Created linear movement from start to end positions
- Used Inverse Dynamics to find stick head velocity
- Attempted Forward Dynamics
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RESULTS

- It works!
- The more experienced throwing form was faster than the less experienced form
RESULTS

- Some joints extend while most flex or stay somewhat constant
DISCUSSION AND THE FUTURE

- Goal of Course Project assignment accomplished
- More of a focus in model design than implementation
- Even though the model does not provide “new” results, it is the first created

Future Work
- Add finger joints to create closed hand
- Add muscles
- Correct Forward Dynamics issues
- Run actual experiment