

# Fully-resolved simulation of esophageal transport

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### Motivation:

- Understand physiology: structure & function of human esophagus & digestive system
- Understand pathophysiology: swallowing disorder, reflux
- Provide clinical guidance: diagnosis, treatment

### Overview of the problem:

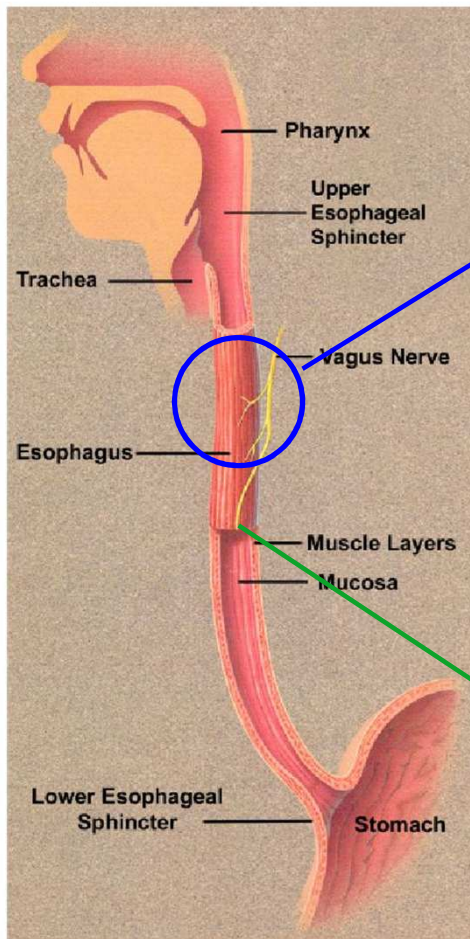


Fig. Esophagus  
Ghosh SK. (PhD Thesis, 2005)

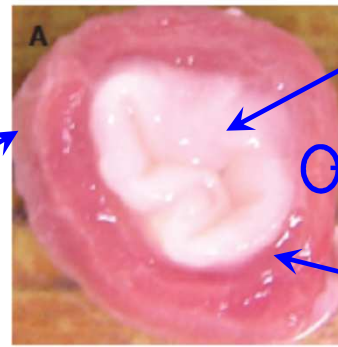


Fig. Esophagus cross-section  
W Yang, et al. World J Gastroenterology 2007

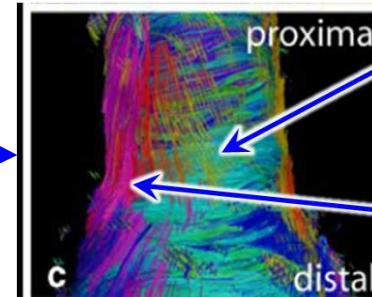
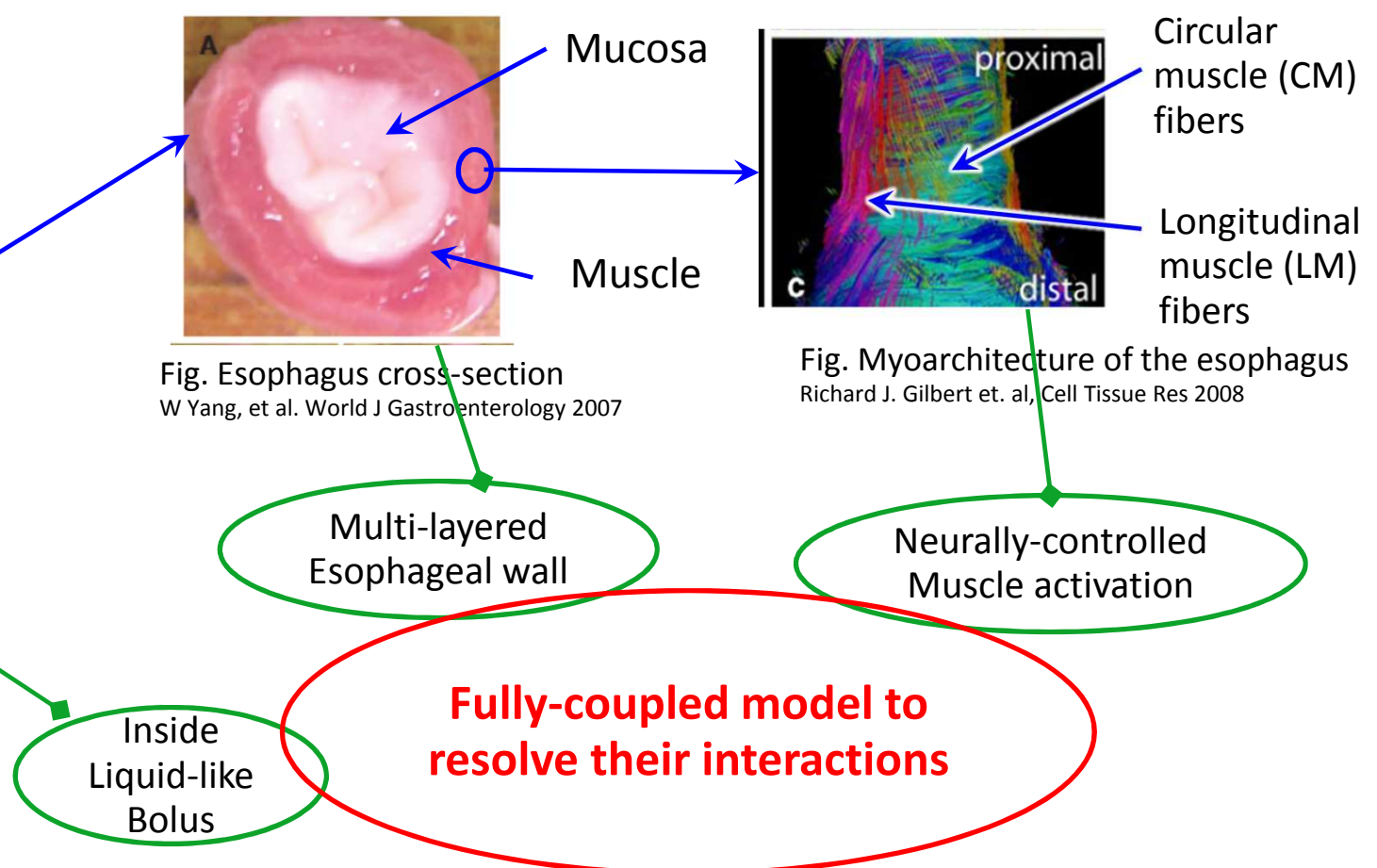
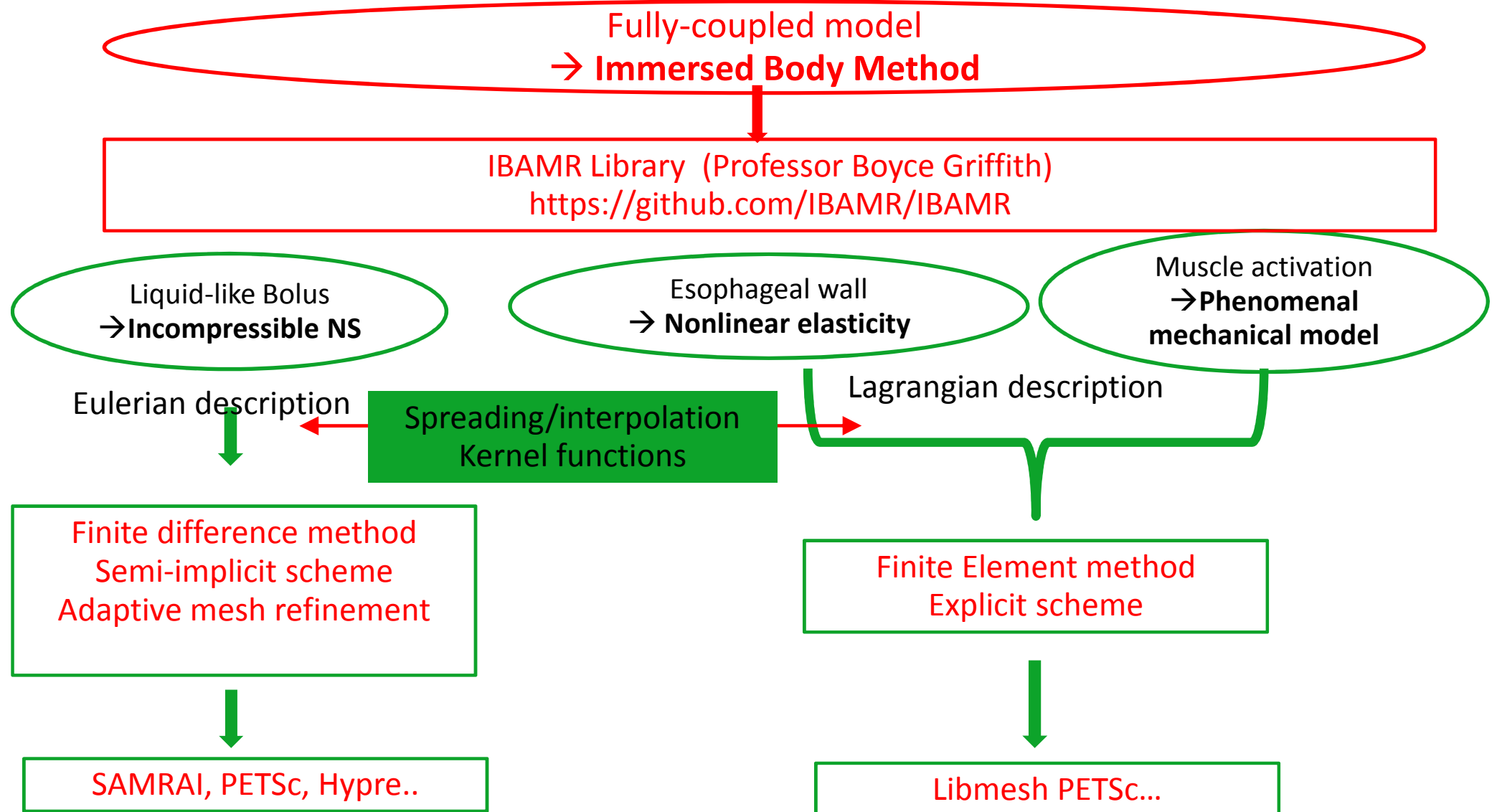


Fig. Myoarchitecture of the esophagus  
Richard J. Gilbert et. al, Cell Tissue Res 2008





## Method & Implementation



## Results

**Case:** A bolus transports resulting from the activation of both circular and longitudinal muscle contractions.

**Results:**

- Muscle contraction generates wall stress and pumps bolus down;
- Esophageal segment undergoes very large deformation: first dilated, then contracted;
- *For **fluid-structure interaction with very large deformation**, immersed boundary method seems to be a feasible way.*

