

# Modelling contact behavior of synovial joints

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## Abstract

The low friction of synovial joints may arise from the coupling the synovial fluid flow in the cartilage gap and deformation of cartilage. However, the fundamental contact behavior of cartilage has not been fully understood so far. The purpose of this study is to investigate the basic synovial joint lubrication mechanics through developing numerical models and conducting experimental tests. Our results show that, as the cartilage contact gap closes, the permeability of the contact gap gradually approaches that of the cartilage tissue, and the gap is gradually 'functional closed' when the gap permeability approaches to that of cartilage tissue. In addition, the gap size plays an important role in controlling the fluid permeability and apparent viscosity within the cartilage gap.

**Keywords:** cartilage; contact gap; gap permeability; synovial fluid.