Study on necking propagation of double network hydrogel

†*I. Riku, and K. Mimura

Department of Mechanical Engineering, Osaka Prefecture University, Japan

*Presenting author: riku@me.osakafu-u.ac.jp
†Corresponding author: riku@me.osakafu-u.ac.jp

Abstract

To take advantage of the toughness mechanism of double network hydrogels (DN gels) and explore the possibility for engineering application as the structural member, the clarification of mechanism of the onset and propagation of the necking phenomenon under simple tension is indispensable.

In this paper, we at first propose the development equation of the number of molecular chain's segments of DN gel. Then, the rate type of constitutive equation of the DN gel is derived based on the nonaffin molecular chain network theory. Finally, a large scale 3 dimensional simulation is performed for the nonuniform DN gel and the microscopic distribution of the number of molecular chain's segments and that of the stress are discussed.

Keywords: Necking propagation, Constitutive equation, 3D simulation, Double network hydrogel.