

Analysis of Degrading Asbestos fibers in MW Field by COMSOL Multiphysics

Keiichiro Kashimura¹

1. Faculty of Engineering, Chubu University, 1200 Matsumoto-cho, Kasugai, Aichi 487-8501, Japan

Introduction:

In recent years, a high temperature process using electromagnetic waves as a heat source attracts great attention. By using microwaves, it is possible to detoxify asbestos fibers in a short time. We have experimentally verified the technology of asbestos detoxification by microwave and reported the efficiency of the process. In the poster section, we will introduce how computational experiments using COMSOL contributed to elucidation of this degrading mechanism, from the standpoint of experiment researchers.



Figure 1 MW Steel Making. This furnace can make 120 kg pig iron per day [1].

Experimental Data:

Experimental results show that substances containing asbestos are rendered harmless by microwave heating [2]. The number of asbestos fibers in the slate rope decreases as retention time and holding temperature increase. It was a mission of calculation experiment to elucidate this cause.

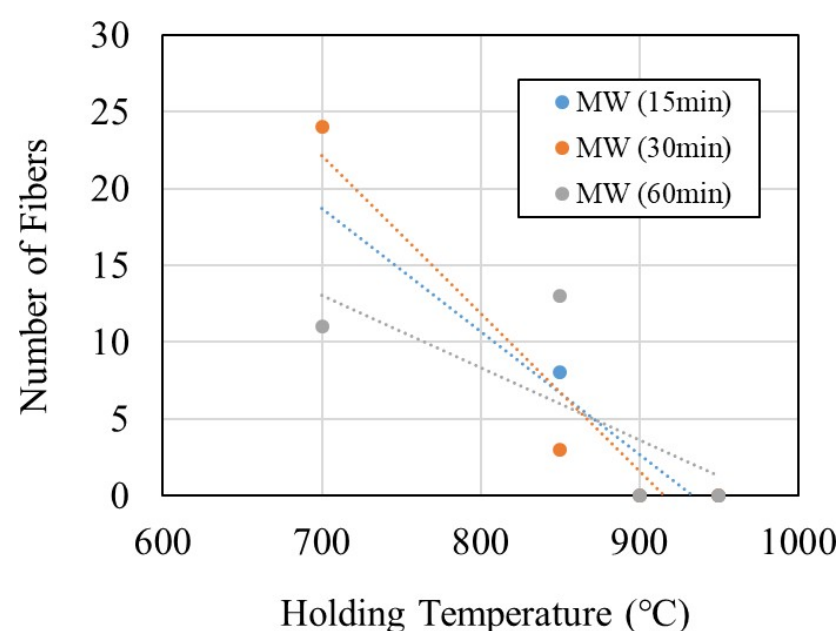


Figure 2 Holding time vs the number of fibers. Asbestos Fibers decreases with temperature increasing.[2]

References:

1. Journal of the Technical Association of Refractories Japan, 34 [2] (2014) 66-73
2. Journal of Hazardous, Toxic, and Radioactive Waste (2014) 04014041-1-5
3. Journal of Hazardous Materials, 284 (2015) 201-206

Results:

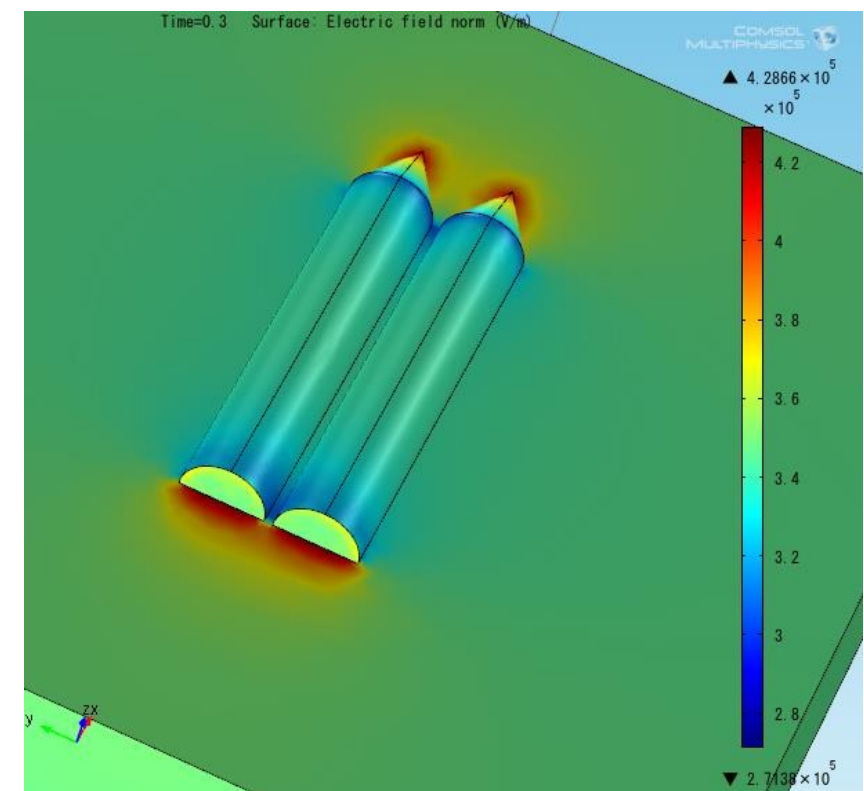


Figure 3 Electromagnetic field analysis of the top of fibers.

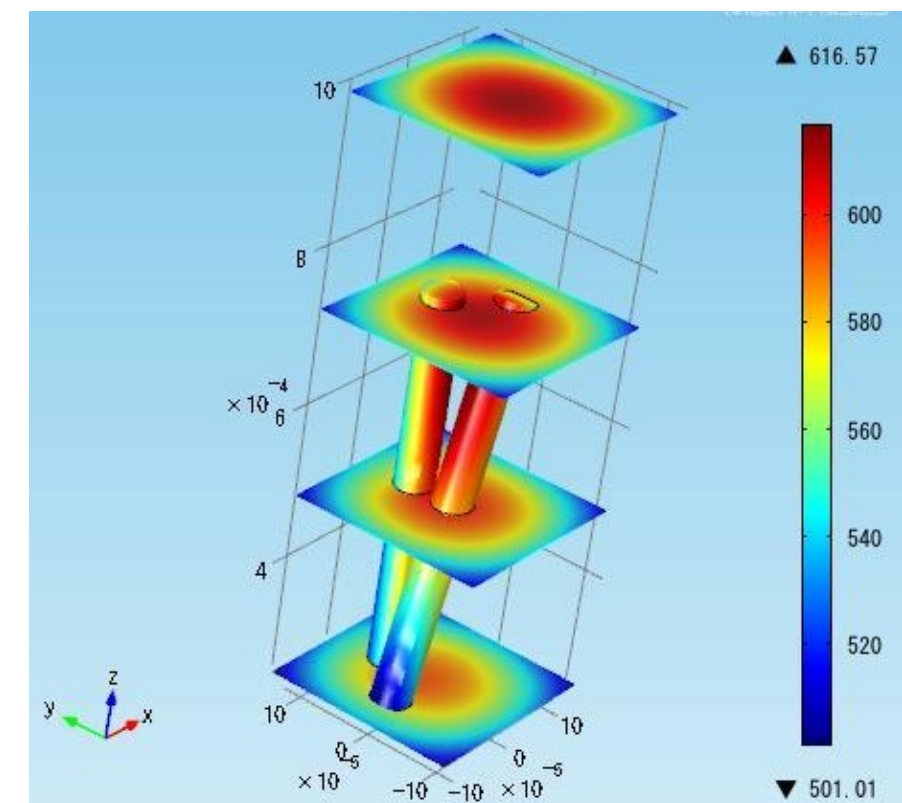


Figure 4 Electromagnetic field analysis of fibers [3].

Discussions:

When assuming engineering applications, electromagnetic field analysis should be examined by experimental results. Since COMSOL can be used by experimental researchers, it is suitable for elucidating the mechanism that is difficult to observe from the experiment. The derived results should be checked experimentally.

