Computational Model to Predict the Pressure Change Inside a Pressure Cooker

Dr. C. Anandharamakrishnan [1], Priyadarshini S R[1], Yoha K S[1], Dr. Moses JA [1]

[1]Indian Institute of Food Processing Technology (IIFPT), Thanjavur, Tamil Nadu, India

Abstract

Pressure cooking is one of the well-known, rapid and energy efficient method of cooking various food products. A conventional home-scale pressure cooker is a sealed vessel which uses an external heat source and can maintain pressure approximately up to 0.1 MPa. Despite equipping pressure release valve as one of the basic safety measures, pressure cooker explosions have been reported and the results can be disastrous. In order to avert such situations, suitable visualization of pressure build-up within the system becomes indispensable. Considering this situation, a computational model was developed to predict the heat and pressure distribution during the cooking process.

A time-dependent heat and pressure changes inside the pressure cooker during the cooking of potato were modeled. The heat transfer in fluids module was used to determine the heat distribution of superheated steam and the laminar flow module was used to determine the pressure distribution within the system. The model estimated a maximum pressure inside the pressure cooker of about 0.137 MPa when the cooking time reached to 10 minutes. The predicted values were in accordance with the results from similar studies. Hence this model could be used to predict the heat and pressure distribution inside a pressure cooking system.

Figures used in the abstract

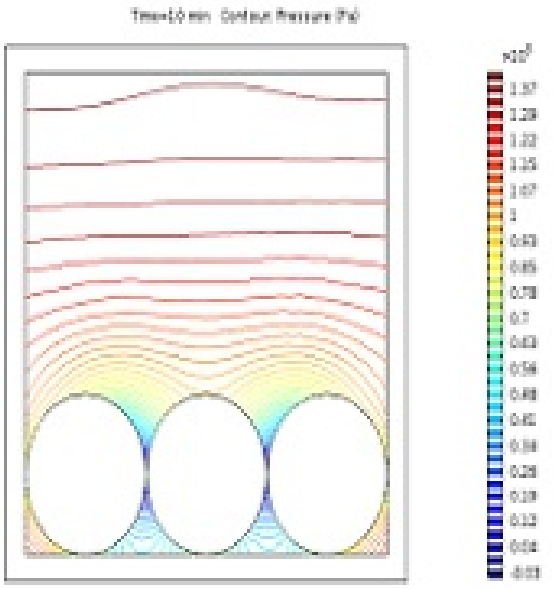

Figure 1: pressure distribution after the tenth minute