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NUMERICAL MODELLING OF PLATE HEAT EXCHANGER GASKET

Hongyi Zhao[1]*, Jensen Aw[1], Andrew Norbury[1] and James Ren[1]

[1] School of Engineering, Liverpool John Moores University, Liverpool, L3 3AF, UK
E-mail address: H.Zhao@2010.ljmu.ac.uk; C.S.Aw@2010.ljmu.ac.uk; X.J.Ren@ljmu.ac.uk

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Gaskets are mechanical seals used to stop leakage of fluid or air medium. One typical application of rubber gasket is in plate heat exchangers, which are widely used in chemical and energy industries [1]. The main advantages of plate heat exchanger lie in its lower space requirement, high efficiency, easiness of disassembly for cleaning and sterilization. In the assembly, the gaps between the plates form liquid flow channels and the gasket need to effectively border the plate as well as the holes where the medium is being transported. The material properties and mechanical behaviour of the gasket under different loading conditions directly influence the performance of the heat exchangers. Accurate characterisation of the linear and nonlinear material parameter of gasket rubber such as EPDM is very important for simulating the deformation of the gasket in both the initial assemble process and in service [2-4].

In this work, the deformation of EPDM gasket has been experimentally and numerically studied. Rubber gasket specimen are tested under different loading conditions including uniaxial tension, uniaxial compression, volumetric and shear tests; The feasibility of different strain energy functions for describing the EPDM gasket material is established; The use of gasket link element approach as a simplified way of modelling large gasket in full scale is established as part of an integrated modelling approach. The effect of pressure dependent frictional condition on the gasket behaviour is also systematically analysed. The work represent an effective way of integrated modelling of the initial assemble process of gasket plate heat exchangers and the behaviour of the system in service, thus could potentially be used in design optimisation and new products development.

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