Modelling of ultrasonic devulcanisation of tyre rubbers and comparison with experiments

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An attempt has been made to simulate a novel continuous ultrasonic process for devulcanising of ground rubber tyres. The model is based on a mechanism of rubber network breakup caused by cavitation, which is created by high intensity ultrasonic waves in the presence of pressure and heat. Theoretical results are obtained for the development of pressure, velocity, shear rate, and temperature during devulcanisation together with gel fraction and crosslink density of devulcanised rubber. Comparison of predicted and experimental data on gel fraction, crosslink density, and pressure indicates that the model describes experimental observation qualitatively only. Deficiencies of the present modelling are emphasised and some possible methods of improving the model are described, particularly with regard to the flow mechanism of ground rubber tyres in the die.
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