This paper considers the flow in porous media that occurs in coastal and offshore engineering problems. Over the past decades numerous formulations of flow equations for porous media have been presented. The present work re-examines the porous media equations of the most recent form and corrects some shortcomings which were identified. The applied type of porosity models relies on empirical resistance coefficients which often need to be measured or calibrated. Only few examples of calibration for numerical models which are present in the literature often applied the same experimental results. In this study new calibration cases were introduced to the calibration procedure in order to achieve a better understanding of the variation of the resistance coefficients. Hereby the coefficients were determined with a better description over the entire parameter space for the resistance coefficients than previously found in the literature. Constant values for the resistance coefficients for a broad range of flow conditions were recommended based on the new calibrations. The model was validated for the main physical processes that occur in wave–structure interaction in coastal structures including three-dimensional wave–structure interaction, run-up, run-down and pressure damping, regular and irregular wave conditions and evaluation of overtopping. Simple two and three dimensional uniform caisson structures and breakwater layouts were investigated. The model was implemented in the open source CFD library OpenFOAM® and has been made publicly available to the engineering community as part of the wave generation framework waves2Foam.

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