

# **A 2-D TIME-DEPENDENT RIPPLE PREDICTION MODEL FOR WAVE DOMINATED FLOWS**

By

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## **ABSTRACT**

The development of a new 2-D, time dependent ripple prediction model is presented which allows for the prediction of ripple wavelength, height and orientation. The model is an extension to that developed by Traykovski (2007) and uses an equilibrium ripple sub-module that provides the target geometry of the sea bed. Temporal variability of the hydrodynamic conditions causes ripple geometry to lag behind and not always agree with that predicted by existing equilibrium models. The new model has the ability to predict the three dimensionality of the sea bed, something not achievable with the 1-D model. A comparison of the 2-D and 1-D models is carried out under a variety of synthetic wave forcing conditions and equilibrium ripple modules and the predicted ripple characteristics are compared. The results show that for a constant wave direction, both the 1-D and 2-D models are in agreement. However, under changing wave directions, the 2-D model predicts a significant lower ripple height during transition from one ripple state to another. In addition, two new parameters provided by the 2-D model, defined as the normalized wavelength and orientation spectral width provide an indication of the bedform irregularity.