Wan, Min; Wang, Yu; Bae, Egil; Tai, Xue-Cheng and Wang, Desheng: Reconstructing Open Surfaces via Graph-Cuts

Abstract: A novel graph-cuts-based method is proposed for reconstructing open surfaces from unordered point sets. Through a Boolean operation on the crust around the data set, the open surface problem is translated to a watertight surface problem within a restricted region. Integrating the variational model, Delaunay-based tetrahedral mesh and multiphase technique, the proposed method can reconstruct open surfaces robustly and effectively. Furthermore, a surface reconstruction method with domain decomposition is presented, which is based on the new open surface reconstruction method. This method can handle more general surfaces, such as nonorientable surfaces. The algorithm is designed in a parallel-friendly way and necessary measures are taken to eliminate cracks and conflicts between the subdomains. Numerical examples are included to demonstrate the robustness and effectiveness of the proposed method on watertight, open orientable, open nonorientable surfaces and combinations of such. IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS, 19, (2), 306-318, Published: FEB 2013

Skogestad, Jan Ole; Keilegavlen, Eirik and Nordbotten, Jan M.: Domain decomposition strategies for nonlinear flow problems in porous media

Abstract: Domain decomposition (DD) methods, such as the additive Schwarz method, are almost exclusively applied to linearized equations. In the context of nonlinear problems, these linear systems appear as part of a Newton iteration. However, applying DD methods directly to the original nonlinear problem has some attractive features, most notably that the Newton iterations now solve local problems, and thus are expected to be simpler. Furthermore, strong, local nonlinearities may to a less extent affect the numerical algorithm. For linear problems, DD can be applied both as an iterative solver or as a preconditioner. For nonlinear problems, it has until recently only been understood how to use DD as a solver. JOURNAL OF COMPUTATIONAL PHYSICS, 234, 439-451, Published: FEB 1 2013

Ali, Alfatih and Kalisch, Henrik: Reconstruction of the pressure in long-wave models with constant vorticity

Abstract: The effect of constant background vorticity on the pressure beneath steady long gravity waves at the surface of a fluid is investigated. Using an asymptotic expansion for the streamfunction, we derive a model equation and a formula for the pressure in a flow with constant vorticity. The model equation was previously found by Benjamin (1962), [3], and is given in terms of the vorticity omega(0), and three parameters Q, R and S representing the volume flux, total head and momentum flux, respectively.

The focus of this work is on the reconstruction of the pressure from solutions of the model equation and the behavior of the surface wave profiles and the pressure distribution as the strength of the vorticity changes. In particular, it is shown that for strong enough vorticity, the maximum pressure is no longer located under the wave crest, and the fluid pressure near the surface can be below
atmospheric pressure. EUROPEAN JOURNAL OF MECHANICS B-FLUIDS, 37, 187-194, Published: JAN-FEB 2013

Gao, Jiti; Tjostheim, Dag and Yin, Jiying: Estimation in threshold autoregressive models with a stationary and a unit root regime

Abstract: This paper treats estimation in a class of new nonlinear threshold autoregressive models with both a stationary and a unit root regime. Existing literature on nonstationary threshold models has basically focused on models where the nonstationarity can be removed by differencing and/or where the threshold variable is stationary. This is not the case for the process we consider, and nonstandard estimation problems are the result.

This paper proposes a parameter estimation method for such nonlinear threshold autoregressive models using the theory of null recurrent Markov chains. Under certain assumptions, we show that the ordinary least squares (OLS) estimators of the parameters involved are asymptotically consistent. Furthermore, it can be shown that the OLS estimator of the coefficient parameter involved in the stationary regime can still be asymptotically normal while the OLS estimator of the coefficient parameter involved in the nonstationary regime has a nonstandard asymptotic distribution. In the limit, the rate of convergence in the stationary regime is asymptotically proportional to $n^{-1/4}$, whereas it is $n^{-1}$ in the nonstationary regime. The proposed theory and estimation method are illustrated by both simulated data and a real data example. JOURNAL OF ECONOMETRICS, 172, (1), 1-13, Published: JAN 2013

Tjostheim, Dag and Hufthammer, Karl Ove: Local Gaussian correlation: A new measure of dependence

Abstract: It is a common view among finance analysts and econometricians that the correlation between financial objects becomes stronger as the market is going down, and that it approaches one when the market crashes, having the effect of destroying the benefit of diversification. The purpose of this paper is to introduce a local dependence measure that gives a precise mathematical description and interpretation of such phenomena. We propose a new local dependence measure, a local correlation function, based on approximating a bivariate density locally by a family of bivariate Gaussian densities using local likelihood. At each point the correlation coefficient of the approximating Gaussian distribution is taken as the local correlation. Existence, uniqueness and limit results are established. A number of properties of the local Gaussian correlation and its estimate are given, along with examples from both simulated and real data. This new method of modelling carries with it the prospect of being able to do locally for a general density what can be done globally for the Gaussian density. In a sense it extends Gaussian analysis from a linear to a non-linear environment. JOURNAL OF ECONOMETRICS, 172, (1), 33-48, Published: JAN 2013