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# Abstracts of Papers to Appear

CASTOR-K: Stability Analysis of Alfvén Eigenmodes in the Presence of Energetic Ions in Tokamaks. Duarte Borba* and Wolfgang Kerner. *Jet Joint Undertaking, Abingdon OX14 3EA, United Kingdom; and *Assoc. Euratom/IST Instituto Superior Técnico, Av. Rovisco Pais, 1096 Lisboa, Portugal.*

A hybrid magnetohydrodynamic-gyrokinetic model is developed for the stability analysis of global Alfvén waves in the presence of energetic ions. The ideal MHD model is extended to take into account the perturbed parallel electric field and the finite Larmor radius which are relevant for high temperature plasmas. The gyrokinetic formulation fully includes the tokamak geometry and the effects of non-standard orbits of energetic ions, which experience large excursions away from the magnetic flux surfaces. The algorithms implemented in the CASTOR-K code are presented together with tests of the numerical accuracy. The orbit integration algorithms are optimized. An efficient algorithm is developed for evaluation of the wave-particle energy exchange expressed by the quadratic form $\delta W_{\mathrm{hot}}$.

Mixed Spectral-Boundary Element Embedding Algorithms for the Navier–Stokes Equations in the Vorticity-Stream Function Formulation. M. Elghaoui and R. Pasquetti. *Lab. J. A. Dieudonné, UMR CNRS 6621 UNSA, Parc Valrose, 06108 Nice, Cedex 2, France.*

An embedding approach, based on Fourier expansions and boundary integral equations, is applied to the vorticity-stream function formulation of the Navier–Stokes equations. The algorithm only requires efficient solvers of scalar elliptic equations and, in an asymptotic version, the boundary element method is only needed to solve the Laplace equation. The capabilities of this embedding method, in both its full and asymptotic versions, are pointed out by considering the classical problem of the flow between two eccentric cylinders.

On the Use of Shock-Capturing Schemes for Large-Eddy Simulation. Eric Garnier,* Michele Mossi,† Pierre Sagaut,* Pierre Comte,*,‡ and Michel Deville.*,† **ONERA, 29, Avenue de la Division Leclerc, BP72 92322 Châtillon Cedex, France; †Laboratoire de Mécanique des Fluides, Ecole Polytechnique Fédérale de Lausanne, CH-1015 Lausanne, France; and ‡IMG/LEGI, BP53 38041, Grenoble Cedex 9, France.*

Numerical simulations of freely decaying isotropic fluid turbulence were performed at various Mach numbers (from 0.2 to 1.0) using known shock-capturing Euler schemes (Jameson, TVD-MUSCL, ENO) often employed for aeronautical applications. The objective of these calculations was to evaluate the relevance of the use of such schemes in the large-eddy simulation (LES) context. The potential of the monotone integrated large-eddy simulation (MILES) approach was investigated by carrying out computations without viscous diffusion terms. Although some known physical trends were respected, it is found that the small scales of the simulated flow suffer from high numerical damping. In a quasi-incompressible case, this numerical dissipation is tentatively interpreted in terms of turbulent dissipation, yielding the evaluation of equivalent Taylor micro-scales. The Reynolds numbers based on these are found between 30 and 40, depending on the scheme and resolution (up to $128^3$). The numerical dissipation is also interpreted in terms of subgrid-scale dissipation in a LES context, yielding equivalent Smagorinsky "constants" which do not level off with time, and remain larger than the commonly accepted values of the classical Smagorinsky constant. On the grounds of tests with either the Smagorinsky or a dynamic model, the addition of explicit subgrid-scale (SGS) models to shock-capturing Euler codes is not recommended.



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ANALYSIS OF ADMITTANCE DATA: COMPARISON OF A PARAMETRIC AND A NONPARAMETRIC METHOD.
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The thermal relaxation times are characteristic parameters of deep levels which can be calculated by the analysis of admittance data. The contributions of these characteristic parameters can be sharp or broadened. If sharp contributions are assumed the analysis procedure is called a parametric method. This procedure leads to a well-posed inverse problem but additionally the unknown number of discrete contributions must be determined. For broadened contributions a nonparametric method is used. This procedure leads to an ill-posed inverse problem but the number of contributions is determined automatically. Both kinds of analysis methods are compared with a Monte Carlo study on simulated admittance data. In addition, the parametric and nonparametric procedures are used to analyze experimental admittance data in order to obtain the deep levels and electrical properties of a semi-insulating GaAs Schottky diode.

OPERATOR SPLITTING METHODS FOR GENERALIZED KORTEWEG–DE VRIES EQUATIONS.
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We apply the method of operator splitting on the generalized Korteweg–de Vries (KdV) equation $u_t + f(u)_x + \varepsilon u_{xxx} = 0$, by solving the nonlinear conservation law $u_t + f(u)_x = 0$ and the linear dispersive equation $u_t + \varepsilon u_{xxx} = 0$ sequentially. We prove that *if* the approximation obtained by operator splitting converges, then the limit function is a weak solution of the generalized KdV equation. Convergence properties are analyzed numerically by studying the effect of combining different numerical methods for each of the simplified problems.