ments on the propagation of weak concentration shock waves and small, but finite, amplitude periodic waves are presented; good agreement is found with classic solutions of Burger's equation. Batchelor's instability conditions are given for bubbly flows, and his model for the bulk modulus of elasticity of the dispersed phase is used to obtain estimates of the critical volume concentration at which a uniform bubbly flow becomes unstable to planar disturbances. Observations of the onset of instabilities of bubbly flow in a pipe are described, and compared with what would be expected from Batchelor's theory.

On the motion of laminar wing wakes in a stratified fluid
Spalart P.R., *Journal of Fluid Mechanics,* 1996, 327/- (139-160). In English.
We present numerical solutions for two-dimensional laminar symmetric vortex systems descending in a stable stratified fluid, within the Boussinesq approximation. Three types of flows are considered: I) tight vortices; II) those deriving from an elliptical wing lift distribution; III) those deriving from a 'high-lift' distribution, with a part-span flap on the wing. The descent velocity increases exponentially with time, as the distance between vortices decreases and the circulation of the vortices proper is conserved. With moderate stratification, wakes with sufficient energy also attain the accelerating regime, until the vortex cores make contact. However, they first experience a rebound, which is both of practical importance and out of reach of simple formulas. Type III wakes produce two durable vortex pairs which tumble, and mitigate the buoyancy effect by exchanging fluid with the surroundings.

High-frequency acoustic noise emission excited by laser-driven cavitation
Likhterov L., *Journal of Fluid Mechanics,* 1996, 318/- (77-84). In English.
A high-frequency part of the acoustic noise spectrum excited by laser-driven cavitation in liquid is investigated theoretically. It is assumed that the liquid is inviscid and compressible and the surface tension may be neglected. The specific heat ratio is taken to be 5/3. It is shown that, in the first approximation, the spectral density of the acoustic energy emitted by a cavity explosion varies as the -4/7 power of the frequency and asymptotically decreases by ~ 3.4 dB/octave.

Stability of stratified flow of large depth over finite-amplitude topography
Prasad D., Ramirez J. & Akylas T.R., *Journal of Fluid Mechanics,* 1996, 320/- (369-394). In English.
The flow of a Boussinesq density-stratified fluid of large depth past the algebraic mountain ('Witch of Agnesi') is studied in the hydrostatic limit using the asymptotic theory of Kantzios and Akylas (1993). The upstream conditions are those of constant velocity and Brunt-Vaisala frequency. On the further assumptions that the flow is steady and there is no permanent alteration of the upstream flow conditions (no upstream influence), Long's model (1953) predicts a critical amplitude of the mountain above which local density inversions occur, leading to convective overturning.

The stability of two-phase flow over a swept wing
Coward A.V. & Hall P., *Journal of Fluid Mechanics,* 1996, 329/- (247-273). In English.
We use numerical and asymptotic techniques to study the stability of a two-phase air/water flow above a flat porous plate. This flow is a model of the boundary layer which forms on a yawed cylinder and can be used as a useful approximation to the air flow over swept wings. We also investigate the instability of inviscid stationary modes. We calculate the effective wavenumber and orientation of the stationary disturbance when the fluids have identical physical properties. Using pertubation methods we obtain corrections due to a small stratification in viscosity, thus quantifying the interfacial effects. Our analytical results are in agreement with the numerical solution which we obtain for arbitrary fluid properties.

Experiments on density-gradient anisotropies and scalar dissipation of turbulence in a stably stratified fluid
Thoroddsen S.T. & Van Atta C.W., *Journal of Fluid Mechanics,* 1996, 322/- (383-409). In English.
The anisotropic behaviour of density-gradient fluctuations in stably stratified grid turbulence and the consequences for simplified (isotropic) estimates of scalar dissipation rates χ were experimentally studied in a thermally stratified wind tunnel at moderate Reynolds numbers (Re_λ 20). The correlation method was used to estimate the mean-square cross-stream and streamwise density gradients. Cross-stream gradients were measured using two cold wires. Gradient spectral relations show that this buoyancy-induced anisotropy persists at all length scales. Better closure of the scalar variance balance was attained than in previously reported measurements by other researchers. This is attributed to our use of cold-wire temperature sensors having larger length-to-diameter ratio then used in the previous measurements.

Fluid-structure interaction and cavitation in a single-elbow pipe system
Tijsseling A.S., Vardy A.E. & Fan D., *Journal of Fluids and Structures,* 1996, 10/4 (395-420). In English.
The simultaneous occurrence of fluid-structure interaction (FSI) and vaporous cavitation in the transient vibration of freely suspended horizontal pipe systems is investigated by numerical simulation and physical experiment. Extended waterhammer and beam equations, including the relevant FSI mechanisms, are solved by the method of characteristics. Column separation and cavitation are accounted for by a lumped parameter model.

Localized convection in rotating stratified fluid
Whitehead J.A., Marshall J. & Hufford G.E., *Journal of Geophysical Research,* 1996, 101/C11 (25705-25721). In English.
The convective overturning of a rotating stratified fluid is studied in the laboratory. The experiments are motivated by physical scaling arguments which attempt to predict the length and velocity scales of the convective chimney as it adjusts under gravity and rotation and breaks up through baroclinic instability. In this idealized problem the depth of penetration is found to depend only on the size and strength of the forcing and the

ambient stratification encountered by the convection event; it does not depend explicitly on rotation. The implications of the work to deep water formation in the Labrador Sea and elsewhere are discussed.

Geyser periodicity and the response of geysers to deformation
Ingebritsen S.E. & Rojstaczer S.A., *Journal of Geophysical Research*, 1996, 101 B/10 (21891-21905). In English.
Numerical simulations of multiphase fluid and heat transport through a porous medium define combinations of rock properties and boundary conditions which lead to geyser-like periodic discharge. Within the rather narrow range of conditions that allow geyser-like behavior, eruption frequency and discharge are highly sensitive to the intrinsic permeabilities of the geyser conduit and the surrounding rock matrix, to the relative permeability functions assumed, and to pressure gradients in the matrix. In theory, heat pipes (concomitant upward flow of steam and downward flow of liquid) can exist under similar conditions, but the simulations suggest that the periodic solution is more stable.

Generation of intermediate water vortices in a rotating stratified fluid: laboratory model
Afanasyev Y.D. & Filippov I.A., *Journal of Geophysical Research*, 1996, 101/C8 (18167-18174). In English..
It is hypothesized that a formation mechanism of anticyclonic eddies (lenses) is the outflow of intermediate waters down the canyons of the continental shelf. The horizontal injection of fluid into the rotating stratified surroundings at the equilibrium density level was reproduced in the laboratory. The experiments demonstrate that such an injection forms an anticyclonic eddy. The periphery of the eddy is formed by the jet flow. The main features of the laboratory flow are consistent with those of the 'young' eddy observed recently in the Gulf of Cadiz.

Principles and practice of hydraulic modelling of braided gravel-bed rivers
Young W.J. & Warburton J., *Journal of Hydrology (New Zealand)*, 1996, 35/2 (175-198). In English.
This paper outlines the principles of the hydraulic modelling of braided gravel-bed rivers, describes the practical limitations of this approach and compares model and prototype characteristics. Modelling procedures are based on the principles of hydraulic (dynamic) similarity. Models of braided river systems involve mobile bed modelling of complex two-phase flow. However, restrictions imposed by scaling ratios for gravitational acceleration, fluid viscosity and fluid density make it impossible to achieve full dynamic similarity, except with a length scale of unity. Therefore model experiments use approximate dynamic similarity, which is to be satisfied only requires similarity of relative depth between the model and prototype.

Are pore size distributions in microfiltration membranes measurable by two-phase flow porosimetry?
Zeman L., *Journal of Membrane Science*, 1996, 120/2 (169-185). In English.
The issue of evaluating equivalent pore diameter distributions in membrane microfilters from gas-liquid (g-l) porosimetry data has been critically examined. Experiments performed with one isotropic and one composite anisotropic membrane in both possible orientations revealed conspicuous dependence of the obtained (g-l) porosimetry peaks on imposed pressure ramp rates, ρ. For two experiments, the observed effects of ρ could be reconciled with predictions of the Schlesinger-Bechhold theory. The data obtained with the thin top layer of the composite membrane facing intruding air directly did deviate somewhat from the theory. Pores characterized by (g-l) porosimetry are likely of the 'throat type', and their size distribution is considerably more narrow than that obtained for the 'node-type' pores by SEM-image analysis. A single bivariate distribution function was constructed for these two distinct pore populations.

Gas sparging to enhance permeate flux in ultrafiltration using hollow fibre membranes
Bellara S.R., Cui Z.F. & Pepper D.S., *Journal of Membrane Science*, 1996, 121/2 (175-184). In English.
This study focuses on the use of gas-liquid two-phase crossflow to overcome concentration polarisation in the ultrafiltration of macromolecular solutions as applied to hollow fibre membrane systems. The experimental work was conducted on a purpose built pilot-plant scale rig with albumin and dextran as the test media. The effect of gas injection on the permeate flux and membrane sieving coefficient was examined at different transmembrane pressures, feed concentrations and gas to liquid flow ratios. The results were encouraging, with flux enhancements of 20-50% obtained for dextran and 10-60% for albumin, when air was injected into the system over the range of process variables examined. The sieving coefficient of albumin was considerably reduced when gas-liquid two-phase cross-flow was used.

Prediction of slurry convection in hydraulic fractures
Clark P.E., *Journal of Petroleum Science and Engineering*, 1996, 15/2-4 (389-391). In English.
The possibility of convective transport during hydraulic fracturing is discussed. Earlier experiments led to a complete analysis of the system which resulted in the development of two dimensionless groups that are useful for predicting the importance of convection in slot flow. This paper describes the dimensionless groups for Newtonian and non-Newtonian fluids, and presents evidence that they can be used to describe slurry flow in a slot. Horizontal versus vertical transport of fracturing fluid slurries is dictated by the forces available to drive the flow in each direction (horizontal, F_H and vertical F_V).

Liquid holdup in horizontal two-phase gas-liquid flow
Abdul-Majeed G.H., *Journal of Petroleum Science and Engineering*, 1996, 15/2-4 (271-280). In English.
The purpose of this study was to simplify and improve the mechanistic model developed by Taitel and Dukler (1976) for estimating the liquid holdup in horizontal two-phase flow. An experimental study was first conducted to develop a data bank used for evaluation and improvement. The holdup data were obtained using an air-kerosene mixture flowed through a test section consisting of a horizontal pipe 2-in (50.8 mm) in diameter and 118 ft (36 m) long. The flow patterns observed were stratified, slug and annular. Based on the measured data, it was found that Taitel-Dukler model tends to overestimate liquid holdup for stratified wavy, slug and annular