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This Journal is published monthly by the American Society of Civil Engineers. Publications office is at 345 East 47th Street, New York, N.Y. 10017. Address all ASCE correspondence to the Editorial and General Offices at 345 East 47th Street, New York, N.Y. 10017. Allow six weeks for change of address to become effective. Subscription price to members is $12.00. Nonmember subscriptions available; prices obtainable on request. Second-class postage paid at New York, N.Y. and at additional mailing offices. GT, HY.

DISCUSSION

Proc. Paper 13787

[a] Discussion period closed for this paper. Any other discussion received during this discussion period will be published in subsequent Journals.

13824 CONTAMINANT TRANSPORT TO DEEP WELLS

KEY WORDS: **Contaminants;** Ground water; Groundwater flow; **Groundwater movement; Groundwater quality; Pollutants; Water pollution;** Water quality; **Wells**

ABSTRACT: The process of convective transport of a conservative contaminant to a deep partially screened pumping well overlain by a zone of contaminated water is described by analytical and numerical techniques. The three-dimensional flow to the well is treated as a point sink in an anisotropic medium. The effects of a regional downward flow, a phreatic surface above the well, and an impervious lower boundary are evaluated. The theoretical results are compared with the observed nitrate contamination of wells on Long Island, New York. It is shown that the local convective transport produced due to pumping greatly accelerates the process of contamination and decontamination of the wells.

REFERENCE: Phillips, Kevin J., and Gelhar, Lynn W., "Contaminant Transport to Deep Wells," *Journal of the Hydraulics Division,* ASCE, Vol. 104, No. HY6, **Proc. Paper 13824**, June, 1978, pp. 807-819

13845 DIFFUSION OF SEDIMENT IN LONG CHANNELS

KEY WORDS: Channels; Convergence; **Diffusion; Dispersion;** Distribution; **Equilibrium methods;** Exponential functions; **Sediment distribution;** Stationary processes

ABSTRACT: A model is presented, treating the transport of suspended material in a broad channel under simplifying assumptions. The motion of sediment is treated as a diffusion process and a differential equation is derived. The form of an "equilibrium distribution" g(y) is derived, corresponding to the classical distribution of Prandtl and Rouse. Mathematically the following two results are proven: (1)If a stationary (time-dependent) state prevails downstream a certain point P, then the distribution downstream P, tends (with increasing distance to P) exponentially to the "equilibrium distribution"; and (2) if the sediment distribution in the incoming water at a point P is stationary from a certain moment, then the distribution downstream P will tend to the stationary solution exponentially with time. Although these results seem to be physically evident, they have apparently not been proven before.

REFERENCE: Aronsson, Gunnar, "Diffusion of Sediment in Long Channels," *Journal of the Hydraulics Division,* ASCE, Vol. 104, No. HY6, **Proc. Paper 13845**, June, 1978, pp. 821-837

13796 REVIEW OF OSCILLATORY BOUNDARY LAYER FLOW

KEY WORDS: **Boundary layer;** Boundary shear; **Estuaries; Flow;** Hydraulics; Hydrodynamics; **Oceanography; Oscillation;** Unsteady flow; Velocity distribution; **Waves**

ABSTRACT: Recent theoretical and experimental knowledge concerning oscillatory boundary layers is reviewed in this paper, and an assessment made of the present state of our understanding of this particular form of unsteady flow. Although agreement is found between theory and experiment for the case of laminar oscillatory flow over a smooth flat bed, our theoretical knowledge concerning other types of oscillatory flow in both laminar and turbulent conditions is shown to be inadequate. Some attention is given to the problem of defining the transition between a truly laminar condition and a fully developed turbulent one for unsteady flow over beds of different roughness and form. Attention is also focused on the increase in boundary shear stress that arises from frequency effects.

REFERENCE: Knight, Donald W., "Review of Oscillatory Boundary Layer Flow," *Journal of the Hydraulics Division,* ASCE, Vol. 104, No. HY6, **Proc. Paper 13796**, June, 1978, pp. 839-855