sion relations[1] provides exact expressions for the linear potential wavefunctions in terms of the generalized hypergeometric functions, for arbitrary values for the orbital quantum number $\ell$. The expressions can be appropriately truncated to obtain the wavefunctions with any desired accuracy.

1. A.F. Antippa and A.J. Phares, J.Math.Phys. 18, 173 (1977); A.J. Phares, ibid 18, 1838 (1977); A.F. Antippa, ibid. 18, 2214 (1977); A.F. Antippa and A. J. Phares, ibid. 19, 308 (1978); A.J. Phares, ibid 19, 2239 (1978).

HG 5 Two-Block Experiment to Study Conduction and Radiation. Lewis W. Webb, Jr. and Kuldip P. Chopra, Old Dominion University. -- The paper describes a simple experiment cosisting of a heat lamp, two thermometers, and two identical metallic (aluminum) blocks. One block has a metallic finish, and the other block has one face painted black. The other five sides of each block are insulated excet for a narrow hole for insertion of a thermometer through the top-side. The exposed surfaces of the blocks are allowed to receive heat from the lamp for fifteen minutes, and the blocks are then allowed to cool during the next fifteen minutes while the lamp is turned off. The core temperatures, measured at the center of each block, are measured at one-minute intervals. The experiment has proven very successful in illustrating the nature and relative significance of the conductive and radiative processes of heat transfer to a class consisting predominantly of non-science majors. A simple modification of the experiment, including measurements of exposed surface-temperatures of the block would help determine the thermal conductivity and relative emissivity of the blocks. The modified experiment may be adopted in more advanced introductory labs.

HG 6 NAVIER-STOKES EQUATIONS, TURBULENCE, AND FRACTIONAL CALCULUS, ELAN MORITZ, ELPA Research Group, 482A Applegarth RD1, Hightstown, NJ 08520. Until now the Navier-Stokes Equation (NSE) has been regarded meaningful *only for integral dimension* d, with the possibility of continuing the solution analytically to nonintegral d in the statistical case[1]. It is shown that NSEs of nonintegral dimensions have simple representations in terms of operators defined by the fractional calculus[2,3]. However, additional requirements for scaling velocity components along rays representing the nonitegral dimensions are necessary. It is quite likely that Turbulence is a manifestation of singularities associated with fractional order. The methodology is easily applied to any dynamical system requiring extension of dimensionality.

1 J.D. Fournier & U. Frisch, Phys. Rev. A17, 747(1978); H.A. Rose & P.L. Sulem, J. Phys.(Paris), 5, 441(1978).

2 K.B. Oldham & J. Spanier, J. Math. Anal. Appl. 39, 655(1972)

3 E. Moritz, Bulletin of the APS, 22, 1250 (1977).

HG 7 Finite-Rank Potential Constructed To Reproduce the Padé Approximant. S. Tani, Marquette -- Let $\phi$, V and G respectively denote the free wave, the potential, and Green's function for a particular partial wave in potential scattering. (i) Introduce the basis functions by iteration, starting from $\phi$: $\Psi_m = (GV)^{m-1}\phi$, $m = 1,\cdots,N$. (ii) Carry out the Schmidt orthogonalization and the normalization on the $\psi$ set, using the potential as the metric of the functional space. Let the new basis be $\chi$. The orthonormal relation is expressed as

$\langle\chi_m V \chi_n\rangle = \delta_{mn}$.

(iii) Introduce form factors by operating V on the members of the $\chi$ set:

$\xi_m = V\chi_m$. (iv) Construct a rank-N potential by using the $\xi$ set

$$\langle r|V^{[N]}|r'\rangle = \sum_m \xi_m(r)\ \xi_m(r').$$

The exact K matrix obtained from this rank-N potential agrees with the [N,N] Padé approximant of the original problem.[1]

1 S. Tani, Phys. Rev. 139, B1011 (1965).

HG 8 Absolute Space-Time and the Michelson-Morley Result. J.P. WESLEY, Behmstr. 32, 1000 Berlin 65 -- Marinov's measurement of the earth's absolute velocity in the closed laboratory makes special relativistic kinematics untenable. Assuming absolute space-time, the Michelson-Morley result may be explained as a nonclassical Doppler effect. The observed isotropic phase velocity (but not photon velocity) is a dynamic rather than a kinematic effect. Light is a quantum wave rather than a classical wave. The frequency and propagation constant are dynamic rather than kinematic properties, $\omega = E/\hbar$, $k = p/\hbar$. The frequency and propagation constant observed depend upon the active dynamic mode of observation rather than the passive kinematical mode of observation. The observer affects the quantum wave phenomenon being observed. Einstein dynamics is preserved but with Galilean kinematics. Maxwell theory is preserved; it predicts the phase velocity rather than the photon velocity.

HG 9 Döppler Effect Resolution of Time Dilation, J. G. WINANS, State U. of N.Y. at Buffalo. The General Döppler Effect equation is $T_A(c-v_A\cos\theta_A) = T_B(c-v_B\cos\theta_B)$. $T_A$ and $T_B$ are signal periods for A or B as senders or receivers, $\theta_A$ and $\theta_B$ are angles between velocities $v_A$ and $v_B$ and wave velocity c, directed from sender to receiver. Relativistic Döppler Effect equations are $T_R = T_S k$, for recession, and $T_R = T_S(1/k)$ for approach, where $T_R$ is the period received and $T_S$ is the period sent. $k = ((c+v)/(c-v))^{1/2}$, and $\dot{v}$ is the relative velocity of approach or recession. Relativistic Döppler equations show time dilation and the General Döppler equation shows no time dilation and no twin paradox. Relativistic Döppler equations and the Lorentz transformation factor, $(1-v^2/c^2)^{-1/2}$, can be derived from the General Döppler equation by making $T_A$, for a given $T_B$, either independent of which station is sender, or independent of the direction of the relative velocity. Time dilations, using sound waves, are eight orders of magnitude greater than time dilations using light waves. Time dilation and the twin paradox thus reduce to absurdities.

HG 10 Periods of Nonlinear Oscillators. T.W. CHEN, New Mexico State U.—A new method for evaluating periods of oscillations will be reported. The method which makes full use of the fact that the major contribution to period comes from the region near the turning points in an oscillatory motion has the following features: (1) It is nonperturbative; and (2) it provides much simpler way for solving nonlinear oscillation problems. The general form $\frac{1}{2}kx^2 + \frac{1}{n}bx^n$ is considered. The periods for any b and n>2 are solved analytically. Comparison is made with standard perturbative solutions for n=3 and 4.

HG 11 A Quantum Psychology Experiment. ELIHU and THELMA LUBKIN, U. of Wis.-Milwaukee 53201--Any of 16 states of mind (I) are prepared at random by showing subject one of 8 Necker cubes[1] on an HP-1317, and recording a 2-way joystick response. Next view provides 8 tests (J) of 2 outcomes (K) each. Probabilities $p_{IJK}$ from 30746 transitions were fitted by an N×N quantum-matrix fitting program (77 effective fitting parameters efp in this case) with N=2 (3,4 also available), and by a classical diagonal-matrix program with 80 efp. Raw RMS theory-experiment probability discrepancies were similar, .080 and .082: our single clumsy experiment finds no evidence for quantum-mechanical coherence in psychology.

[1]E. Lubkin in Foundations of Probability Theory, Statistical Inference, and Statistical Theories of Science, Vol. III, eds. Harper and Hooker, Reidel, 1976.