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THE APRIL MEETING OF THE IOWA SECTION

The 48th regular meeting of the Iowa Section of the Mathematical Association of America was held at Simpson College, Indianola, on the afternoon of April 14 and the morning of April 15, 1961. Professor Irvin Brune presided as Acting Chairman in behalf of Professor H. C. Trimble, Chairman of the Section, who could not be present. Total attendance was 81, including 35 members of the Association. Routine business was considered during the afternoon meeting of April 14.

The following officers were elected:

Chairman, Professor Hazel M. Rothlisberger, University of Dubuque, Dubuque

Vice-Chairman, Professor William L. Waltmann, Wartburg College, Waverly

Secretary-Treasurer, Professor Earle L. Canfield, Drake University, Des Moines

Professor Irvin Brune and Professor H. A. Heckart (Simpson College) served as the auditing committee and verified the treasurer's report given.

The following papers completed the program:

Friday afternoon, April 14, 1961.

Proof of the remainder theorem. Professor H. A. Heckart, Simpson College.

Integration of cot x sin 2mx ln (sin x/sin a)dx. Professor Don Kirkham, Iowa State University.

For m = 1, 2, ...the title integral and some related ones are evaluated. The results are obtained in terms of Psi functions.

A mixed boundary value problem for an infinite elastic cylinder. Professor Harry Weiss, Iowa State University.

A thin cylindrical shell problem. Thomas Rogge, Iowa State University, introduced by the Acting Chairman.

The problem of a thin cylindrical shell sector clamped on two curved edges and one straight edge, free on the remaining straight edge and loaded by a load similar to a hydrostatic load is considered. The method of solution is that of superimposing the solutions of three separate problems with the appropriate boundary conditions.

Number theoretic densities for the Gaussian Integers. W. H. Richardson, Iowa State University.

Some of the standard number theoretic densities are defined for the Gaussian integers; and for these are established results analogous to corresponding cases for the rational integers. For example, one possible asymptotic density is given by lim inf $A(n)/N(n)$, where $A(n)$ is the number of elements of A in the half-open square determined by o, n, and ni, and $N(n)$ is the norm of the Gaussian integer n.

A modified Runge-Kutta solution of ordinary differential equations. G. D. Byrne, Cyclone Computer Laboratory and Professor R. J. Lambert, both of Iowa State University.

Suppose it is required that a particular solution to the differential equation

$$\frac{dy}{dx} = F(x,y)$$

be found. Suppose further that the points (x_{n-1}, y_{n-1}) and (x_n, y_n) lie on the particular solution curve and that they are given. Let $x_n + h = x_{n+1}$, $y_n + k = y(x_{n+1}) = y_{n+1}$. Here h, the step-size is fixed. Therefore, k, the change in y, must be evaluated to find the next point, (x_{n+1}, y_{n+1}), on the particular solution curve. The set of equations

(1) $$k_0^{(n-1)} = hF(x_{n-1}, y_{n-1}),$$

(2) $$k_1^{(n-1)} = hF(x_{n-1} + uh, y_{n-1} + uk_0^{(n-1)}),$$

(3) $$k_0^{(n)} = hF(x_n , y_n),$$

(4) $k_1^{(n)} = hF(x_n + uh, y_n + uk_0^{(n)})$,

(5) $k^{(n)} = a_0k_0^{(n)} + a_1k_1^{(n)} + b_0k_0^{(n-1)} + b_1k_1^{(n-1)}$,

(6) $y_{n-1} \doteq y_n + k^{(n)}$,

(7) $b_0 = \frac{5-6u}{12u}$, (8) $b_1 = \frac{-5}{12u}$

(9) $a_0 = \frac{18u-5}{12u}$, (10) $a_1 = \frac{5}{12u}$,

describes a modified Runge-Kutta method of numerical integration, which has an accuracy of the order of h^3 and which requires only two substitutions into the differential equation for each step of integration. The value of u is dependent upon h and the differential equation.

A note on Boolean Algebras. Professor M. F. Ruchte, Iowa State University

Integral transforms and boundary value problems. Gary Anderson, Iowa State University, introduced by the Acting Chairman.

Lilliputian Dynamics - the physics of extreme size change. Robert Gordon, Bettendorf High School, Bettendorf, introduced by the Acting Chairman. (By invitation).

Whenever the size of an object or animal is changed, the scale factor must be considered. It was discovered experimentally that because strength is proportional to cross-sectional area, while mass is proportional to volume, a large animal or object, built similar to a smaller one, will be weaker, proportionately, by a factor of scale. Also, the smaller an object or animal becomes, the more surface area, relative to mass, it has. This explains why very small animals seem extremely hungry and are easily water-logged. Scaling is also important when the behavioral properties of various size ships are considered. These are but a few of the many aspects of scaling.

Saturday morning, April 15, 1961

Recommendations of CUPM. Panel on Teacher Training. Professor William R. Orton, Department of Mathematics, University of Arkansas.

Iowa College Reactions to CUPM recommendations. Staff members of representative Iowa Colleges: Professor J. O. Chellevold, Professor O. C. Kreider, Iowa State University, N. L. Jacobson, Graceland, Professor H. V. Price, State University of Iowa. Questions and comments from the floor.