and

$$|P(z)|<2 \quad \text{for all} \quad z\in(0,H_p^2) \quad \text{with } H_p^2 \text{ as large as possible.}$$

This problem arises in the construction of explicit two-step methods with extended intervals of periodicity. Such methods of order two and four have been recently proposed in [1]. The proposed problem arises in the construction of such explicit methods of order six. For further details see [1] and for similar material see [2].

REFERENCES

[1] M. M. CHAWLA, *A new class of explicit two-step fourth order methods for $y''=f(t, y)$ with extended intervals of periodicity*, J. Comput. Appl. Math., 14 (1986), pp. 467–470.

[2] P. J. VAN DER HOUWEN, *Construction of Integration Formulas for Initial Value Problems*, North-Holland, Amsterdam, 1977, pp. 238–240.

A Definite Integral of Bessel Functions

Problem 87-18, *by* M. L. GLASSER (Clarkson University).

Various integrals of the function $F(x)=I_0(x)-L_0(x)$ (where $L_0(x)$ is a modified Struve function) arise in the study of the diffusion of a swarm of charged particles normal to an applied electric field [1]. Let

$$J_n=\int_0^\infty \{F(x)\}^n\,dx.$$

It is known that J_1 is divergent. Show that $J_2=1$ and $\lim nJ_n=\pi/2$.

Can any other values of J_n be obtained in closed form?

REFERENCE

[1] M. L. GLASSER, *Line shape analysis for ion mobility spectroscopy*, Analytical Chemistry, submitted.

x

A Definite Integral from Surface Gravity Waves

Problem 87-19*, *by* M. STIASSNIE (Technion, Haifa, Israel).

Prove that

$$\int_{-\infty}^{\infty} x \operatorname{csch} x \operatorname{sech}(x+y)\,dx=(y^2+\pi^2/4)\operatorname{sech} y.$$

The integral arose in a study of the Zakharov equation for surface gravity waves. The envelope soliton is known to be a solution of the cubic Schrödinger equation and therefore it should also be a solution of the equivalent narrow spectrum version of the Zakharov equation.

Three Convolution Integrals

Problem 87-20*, *by* FIKRI KUCHUK (Schlumberger–Doll Research, Ridgefield, Connecticut).

Evaluate the following three integrals:

$$I_1(t)=\int_0^t e^{-\beta\tau}\exp[-\alpha/(t-\alpha)]\,d\tau,$$