$$T^{h}_{\text{line}}(x) = T^{H}_{\text{line}} + \sum_{m=1}^{\infty} \frac{2}{m\pi} \sin(\pi\, m\, T^{H}_{\text{line}}) \cos(m f_o x) \quad (23)$$

$$T^{h}_{sq}(x, y) = T^{H}_{sq} + \sum_{m,n=1}^{\infty}\sum^{\infty} \frac{2}{mn\ \pi^2} \sin[\pi\, m(T^{H}_{sq})1/2]$$

$$\sin[\pi\, m(T^{H})1/2]\ \cos(f_o(mx + ny)) \quad (24)$$

$$T^{h}_{cir}(x, y) = T^{H}_{cir} + \sum_{m,n=1}^{\infty}\sum^{\infty} [2\, T^{h}_{cir}/\ \pi\, T^{H}_{cir}(m^2 + n^2)\, 1/2$$

$$J_1[2\pi\, T^{H}_{cir}(m^2+n^2)\ 1/2].$$

$$\cos[f_o(mx + ny)] \quad (25)$$

$$T^{h}_{ring}(x, y) = T^{H}_{ring} + \sum_{m,n=1}^{\infty}\sum^{\infty}$$

$$[r_2\, J_1[r_2 f^2_o(m^2+n^2)\ 1/2] - r_1\, J_1[\gamma_1(f^2_o(m^2 + n^2)\ 1/2\ ]]/$$

$$[([W(m^2 + n^2)1/2/\ \cos\ f_o(mx+ ny)\ ] \quad (26)$$

$$\text{and } T^{h}_{dia}(x, y) = T^{H}_{dia} + \sum_{m,n=1}^{\infty}\sum^{\infty}[4/m^2\pi^2 - \pi^2\, n^2)]$$

$$\sin[\pi(m + n)(T^{H}_{dia})1/2\ ].$$

$$\sin[\pi(m-n)(T^{H}_{dia})1/2 \cos(f_0(mx-ny)\ ]. \quad (27)$$

where J_1 is the Bessel function of the first kind and $f_o = 2\pi/W$.

We have shown that the spectra of halftone image can be written in the form of Fourier series, where the first term corresponding to the zeroth order is nothing other than the average halftone transmittance, while the other terms are the distortions introduced by the halftone process.

These analytical expressions for transmittance of the halftone photograph will be essential for various image processing studies. The image processing treatment in terms of zero spectral order is too theoretical. In practice the spectral dots corresponding to low frequency information or noise are too difficult to be resolved by a pinhole spatial filter of finite apertures. In realistic cases, higher order terms can not be avoided. A. very recent logarithmic filtering experiment[9] involving the use of a line logarithmic screen have successfully separated multiplicative noises. The inclusion of higher orders ($m \neq 0$) terms in the filtering process essentially explained the presence of additive constant irradiance at the output. More recently[10] it has been shown that the output of an optical homomorphic filtering system is linearly proportional to the input signal for all spectral orders, but the constant of proportionality would depend on the orders of diffraction. The role of Fourier representation in explaining various image processing aspects is clear.

1. Armand, . A., Ph.D. Dissertation, Dept. of Electrical Engg., Univ. of Southern California, 1979.
2. Bryngdahl, O., *J. Opt. Soc. Am.* 1978, **68**, 418
3. Pappu, S. V., Kumar, C. A. and Mehta, S. D., . *Curr. Sci.*, 1978, **47**, 1.
4. Karim, M. A., *Curr. Sci.*, 1980, **49**, 649.
5. Liu, H.K. and Karim, M. A., *Opt. Lett.*, 1979, **4**, 408.
6. Karim, M. A. and Liu, H. K., *Opt. Lett.* 1980, **5**, 132.
7. Karim, M. A., *Curr. Sci.*, 1980, **49**, 921.
8. Kermisch, D. and Roetling, P.G., *J. Opt. Soc. Am.* 1975, **65**, 207
9. Karim, M. A. and Liu, H. K., *Opt. Lett.*, 1981, **6**, 207.
10. Karim, M. A., Ph.D. Dissertation, Dept. of Electrical Engg., Univ. of Alabama, 1981.

ANNOUNCEMENT

HARI OM AWARDS

The following eminent doctors have been selected for the Hari Om Ashram Alembic Research Award for their contributions in Medical Sciences and applied research at field level.

1) Dr. L. K. Kothari, Jodhpur Medical College, 2) Prof. Usha K. Luthra, Deputy Director General of the Indian Council of Medical Research, 3) Prof. A. S. Balasubramanian, Department of Biochemistry, Christian Medical College, Vellore, 4) Dr. (Mrs.) Geeta Talukdar, Calcutta University, Calcutta, 5) Sur. Comde. H. S. Nayar, Department of Physiology, Armed Forces Medical College, Pune and 6) Dr. Shrinivas, Department of Microbiology, All India Institute of Medical Sciences, New Delhi.

The award carried a cash prize of Rs. 5,000/- and a medal.