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A NOTE ON THE DIFFERENTIATION OF ORE BODIES EXHIBITING SIMILAR ANOMALY PATTERNS

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ORE bodies which can be approximated to single poles and thin sheets exhibit similar anomaly shapes. In such a situation it causes ambiguity in deciding the actual geometrical disposition of the ore body. Any magnetic anomaly can be split into symmetric and asymmetric components. The plot of the ratio of the symmetric and asymmetric components, versus the distance x in both the cases gives a straight line. In such a circumstance, another alternative procedure is to be adopted to discern the nature of the source of the magnetic field. A method is suggested to determine whether the anomaly is due to a single pole or a thin sheet.

The analytical expressions for the total field anomaly due to a single pole and a thin sheet are given as follows:

$$\Delta T(X)_{sp} = m.f(x).\ \sin(i - \phi(x)) \quad (1)$$

$$\Delta T(X)_{TS} = M.F(x) \sin(Q - \phi(x)) \quad (2)$$

where $f(x) = (x^2 + h^2)^{-1}$, $F(x) = (f(x))^{1/2}$, $\phi(x) = \tan^{-1}(x/h)$, $M = A.b$, $A = 2KTb$, $b = (1 - \cos_i^2 \cos^2\alpha)^{1/2}$, $Q = 2I - \delta$, and $I = \text{arc} \tan(\tan i/\sin\alpha)$

In this, i is the goemagnetic field inclination, δ dip of the body, α is the strike angle measured clockwise w.r.t. the magnetic north. K is the susceptibility contrast and T is the base level of the total magnetic field intensity. These are shown in figure 1.

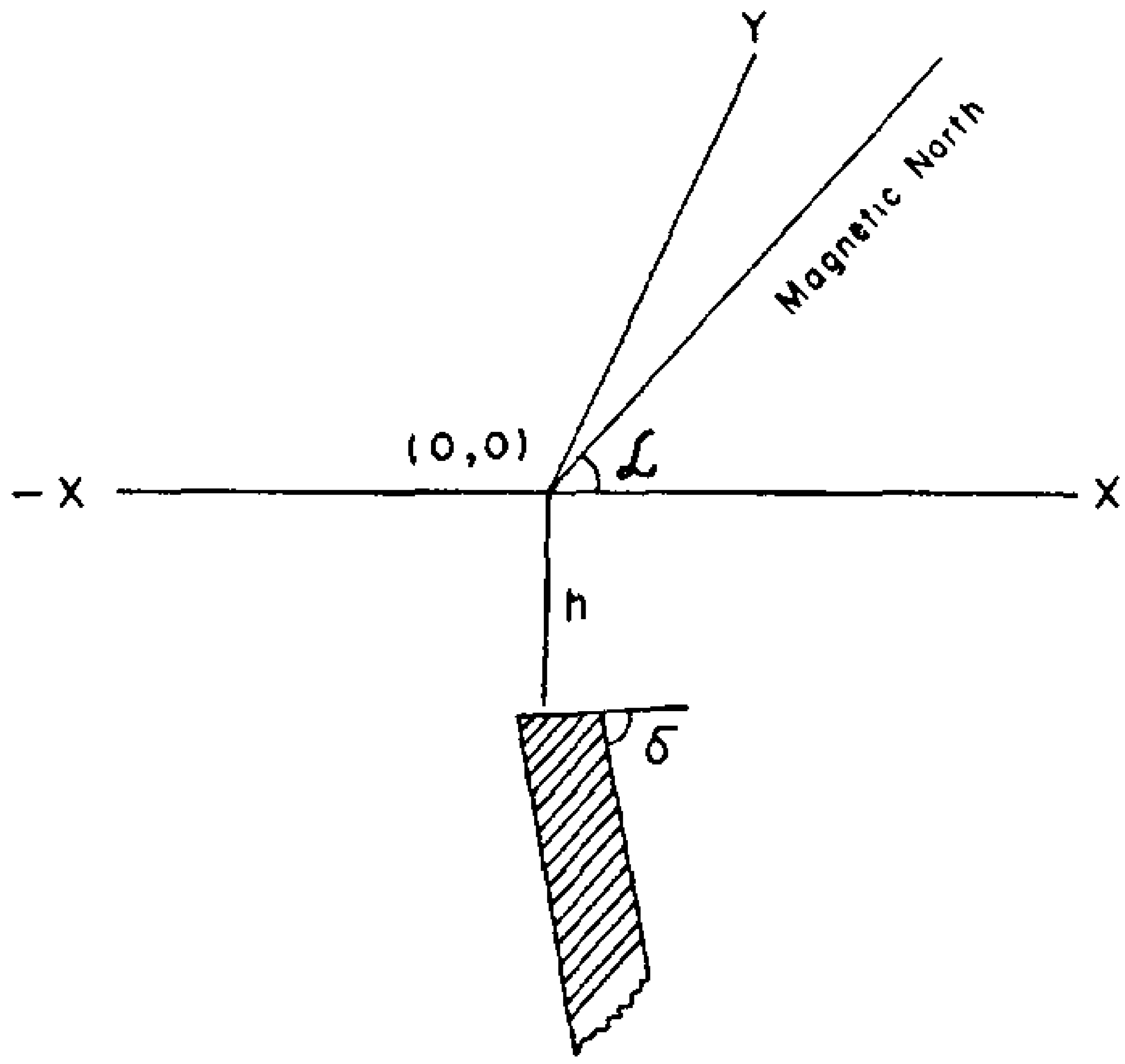

Figure 1. Cross sectional view of a Thin Sheet.

The ratio of the symmetric and asymmetric components in the case of single pole and thin sheet define straight line with differnt slopes.

$$Y_{sp} = (h/x)\tan i \quad (3)$$

$$Y_{TS} = (h/x)\tan Q. \quad (4)$$

Even these two identities do not result in identification of the individual sources.

The horizontal and vertical derivatives of the anomalies in both the above cases can be written as follows. In the case of single pole,

$$\Delta T_H = m.f(x).\ (3\cos(2\phi(x) - i) - \cos i) \quad (5)$$

$$\Delta T_V = m.f(x).\ (3\sin(2\phi(x) - i) - \sin i) \quad (6)$$

where $f(x) = (x^2 + h^2)^{-3/2}$ and $\phi(x) = \tan^{-1}(x/h)$.

In the case of a thin sheet

$$\Delta T_H = M.F(x).\ \cos(\phi(x) + Q) \quad (7)$$

$$\Delta T_V = M.F(x).\ \sin(\phi(x) + Q) \quad (8)$$

where $F(x) = (x^2 + h^2)^{-1}$; $\phi(x) = \tan^{-1}\left(\frac{2xh}{x^2 - h^2}\right)$

In the case of thin sheet, the resultant plot of ΔT_H and ΔT_V is a cardioid satisfying the equation of the form $(m^2 + n^2 - am)^2 = a^2(m^2 + n^2)$, where $m = F(x).\cos\phi(x)$, $n = F(x)\sin\phi(x)$ and $a = (M/2h^2)$. But in the case of single pole it is not a cardioid.

Two theoretical examples have been shown in figures 2 and 3. The horizontal derivative can be calculated easily by the relation: $\Delta T_H = (\Delta T(x + \Delta x)$

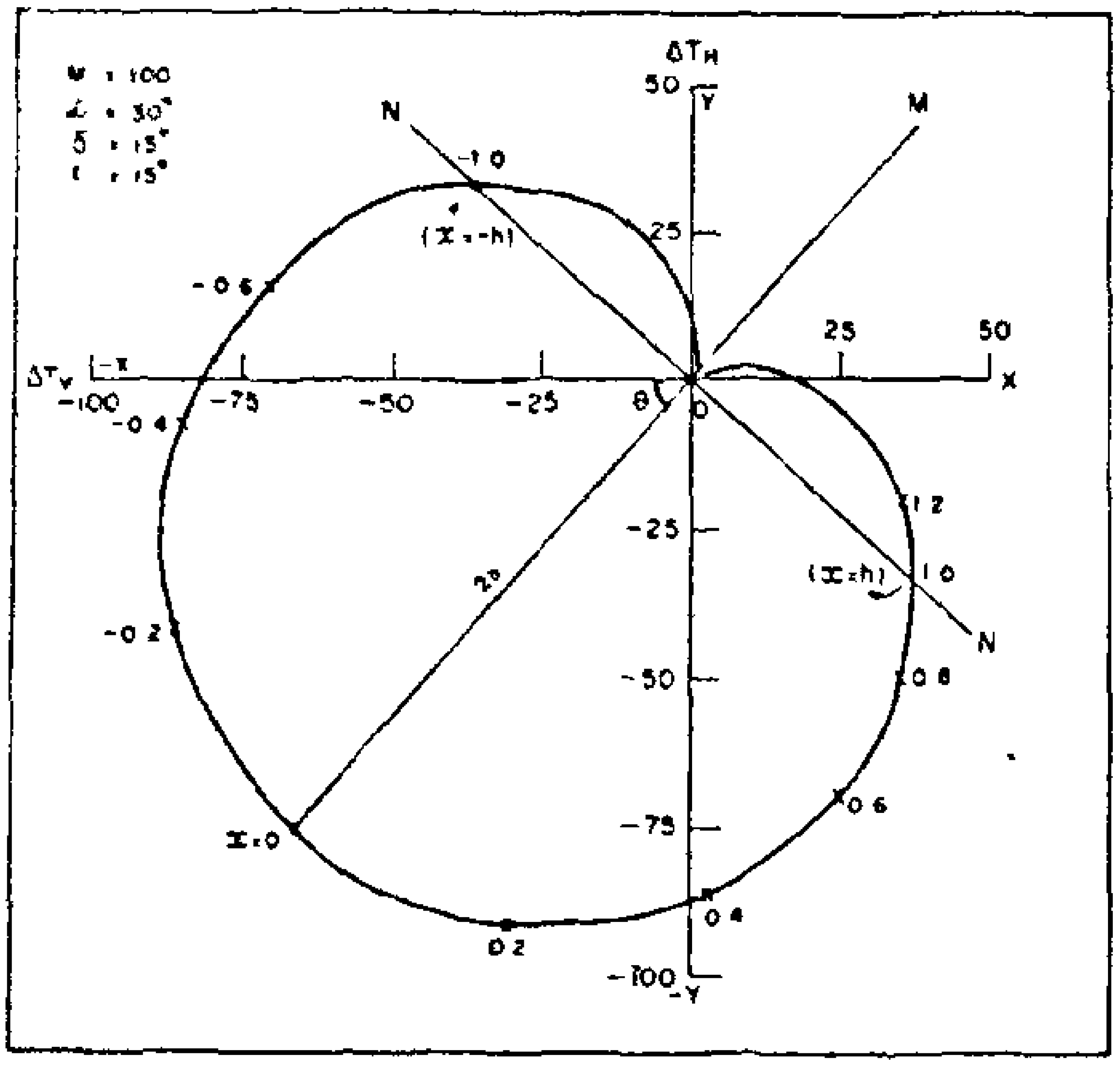

Figure 2. Relation figure resulted due to the plot of ΔT_H versus ΔT_V in the case of a thin sheet (Cardioid).

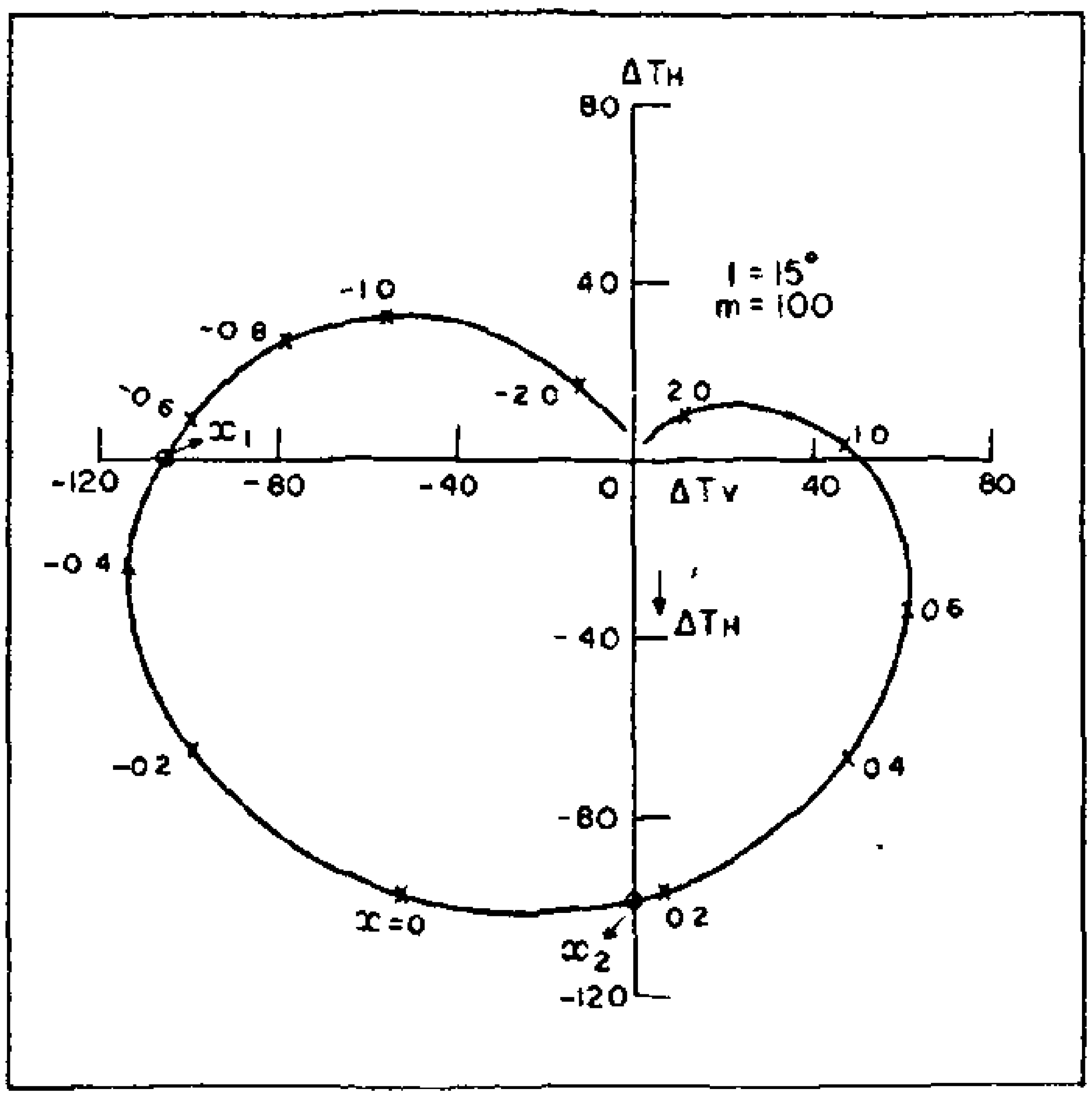

Figure 3. Relation figure resulted due to the plot of ΔT_H versus ΔT_V in the case of a single pole.

$-\Delta T(x-\Delta x))/2\Delta x$. And the vertical gradient can be calculated either by using the Hilbert transform[1] method or $\sin x/x^2$ method. The dip of the thin sheet can be determined by knowing i and α and by the following relation $\theta = Q = 2I - \delta$ where θ is the angle which the new coordinate system MON makes with XOY as shown in figure 2. Depth to the top of the body is the 'x' value on the cardioid where the axis ON cuts this relation figure.

In the case of single pole, the asymmetrical loop resulted due to the plot of ΔT_H and ΔT_V is used to determine depth to the top of the causative source. In this case 'h' is given by the following relations

$$h = \frac{-3x_1 \tan i \pm (8\sec^2 i + \tan^2 i)^{1/2} x_1}{2} \text{ when}$$

$\Delta T_H = 0$

and

$$h = \frac{3x_2 \cot i \pm (8\,\mathrm{cosec}^2 i + \cot^2 i)^{1/2} . x_2}{4} \text{ when}$$

$\Delta T_V = 0.$

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MICROBIAL DEACETYLATION OF CHOLESTEROL

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THE use of microbes for the transformation of steroids dates back to 1937. Since then a lot of reactions, *viz* hydroxylation, dehydrogenation, degradation, resolution of dl-nor-steroids, esterification, de-esterification etc have become possible with microbial enzymes. Attempts were made in our laboratory to transform cholesterol acetate by micro-organisms isolated from soil samples. Indeed, a bacterial strain isolated from a Dioscorea orchard soil could transform cholesterol acetate under liquid culture conditions.

Cells were grown in Erlenmeyer flasks (250 ml capacity) containing 100 ml of sterilised medium (composition G/L: glucose-20, peptone-1, cornsteep