EBOOK

Michael Andre Franiatte

Third and Fourth Degree Polynomial Equation Resolution

New Method for Solving Polynomial Equations of 3 and 4 Degree

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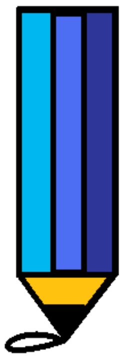

It isn't obvious for a Doctor in Geosciences to master scientific equations when teachers try to fill your mind with lot of definitions and scream on your research, destroy it and reject you cause of discoveries found, teachers would have like to find or simply they haven't an open mind. A mathematical hypothesis named H_L was found by the author of this book when working on Equation of State to demonstrate an empirical equation found by himself. Teachers didn't let the chance to the author to continue as a researcher, but screamed on all works of the author instead. The hypothesis found can be used to resolve with a hand pen all polynomial equations of *3* and *4* degree. Information about license, EULA and contract for using these following works can be found at https://michaelfraniatte.wordpress.com.

Third and Fourth Degree Polynomial Equation Resolution

Michael Franiatte*

Abstract

The works was carry in outstanding with an hypothesis refused by CNRS researchers and directors making studies in Geochemistry with Equation of State using a program never cited in their works, so it's an honor for the author to use his hypothesis for resolving polynomial equations of *3* and *4* degree with a simple pen. The hypothesis was found to demonstrate an empirical equation to resolve Equation of State, display in the book Equation of State Resolution for the Study of Fluids, by the same author (Michael Andre Franiatte born the 14 December 1979 in Nancy, France). The hypothesis is used to simplify polynomial equations of *3* and *4* degree.

Keywords: *polynomial equations, hypothesis, simple pen, simplify, 3 and 4 degree*

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1. Introduction

It isn't obvious for a Doctor in Geosciences to master scientific equations when teachers try to fill your mind with lot of definitions and scream on your research, destroy it and reject you cause of discoveries found, teachers would have like to find or simply they haven't an open mind. A mathematical hypothesis named H_L was found by the author of this book when working on Equation of State to demonstrate an empirical equation found by himself. Teachers didn't let the chance to the author to continue as a researcher, but screamed on all works of the author instead. The hypothesis was used to demonstrate the implication of the number n of constituents in the calculation of PVTX data of fluids with equation of state.

The hypothesis found can be used to resolve with a hand pen all polynomial equations of *3* and *4* degree. The hypothesis is used to find new relations allowing resolving polynomial equations of *3* and *4* degree. So it's possible to use a simple pen and a paper to resolve big polynomial equations ordinary resolved with the help of informatics programs.

2. Method

The hypothesis H_L is written

$$L(x^m) = \frac{x \cdot L'(x^m)}{m} + L(0)$$

$$L(x_i) = \frac{x_i \cdot L'(x_i)}{m_i} + L(0)$$

For

$$L(x_i) = ax_i^3 + bx_i^2 + cx_i + k = 0$$

with D the discriminator and n the degree of the polynomial equation

$$D = b^2c^2 + 18abck - 27a^2k^2 - 4ac^3 - 4b^3k$$

$$\prod_i^n L'(x_i) = -D$$

$$\prod_i^n m_i = -\frac{D}{(ak)^{n-1}}$$

$$L\left(\sum_i^n x_i\right) = k - \frac{bc}{a}$$

with

$$\sum_i^n x_i = -\frac{b}{a}$$

$$\prod_i^n x_i = (-1)^n \frac{k}{a}$$

if m is expressed by

$$m = \frac{-\frac{b}{a} \cdot L'\left(-\frac{b}{a}\right)}{L\left(-\frac{b}{a}\right) - L(0)}$$

$$m = \frac{L'\left(-\frac{b}{a}\right)}{c}$$

m_i is expressed by

$$m_i = -\frac{x \cdot L'(x_i)}{L(0)}$$

and

$$\frac{3a}{3}x^3 + \frac{2b}{2}x^2 + cx + k = \frac{x}{m_i}L'(x_i) + k$$

$$m_i = \frac{L'(x_i)}{ax^2 + bx + c}$$

and

$$m_i = \frac{3ax^3 + 2bx^2 + cx}{-k}$$

$$m_i = \frac{bx^2}{k} + \frac{2cx}{k} + 3$$

Q(x) is expressed by

$$Q(x) = \frac{bx^2}{k} + \frac{2cx}{k} + 3 - m_i = 0$$

with D_i the discriminator of *Q(x)* for each m_i

$$D_i = \left(\frac{2c}{k}\right)^2 - 4 \cdot \frac{b}{k} \cdot (3 - m_i)$$

with

$$x'_i = \frac{-\frac{2c}{k} - \sqrt{D_i}}{\frac{2b}{k}}; x''_i = \frac{-\frac{2c}{k} + \sqrt{D_i}}{\frac{2b}{k}}$$

$$x'_1 + x''_1 = x'_2 + x''_2 = x'_3 + x''_3 = -\frac{2c}{b}$$

with

$$m'_i = -\frac{x'_i \cdot Q'(x'_i)}{Q(0)}; m''_i = -\frac{x''_i \cdot Q'(x''_i)}{Q(0)}$$

$$m'_i \cdot m''_i = m'_i + m''_i$$

$$Q'(x'_i) = -Q'(x''_i)$$

$$\frac{m'_i}{m''_i} = -\frac{x'_i}{x''_i}$$

for x_i when $L(x_i) = 0$

$$L'(x_i) = -b \cdot x_i - 2c - 3\frac{k}{x_i}$$

f'(x) is expressed by

$$f'(x_i) = -b \cdot x_i - 2c - 3\frac{k}{x_i}$$

with

$$uv = \int u'v + \int uv'$$

$$x \cdot f(x) = \int x \cdot f'(x) + \int f(x) = 0$$

$$\int x \cdot f'(x) = -\frac{b \cdot x^3}{3} - c \cdot x^2 - 3k \cdot x + K^{ste}$$

for every x

$$x \cdot L(x) = \int x \cdot L'(x) + \int L(x)$$

$$\int x \cdot L'(x) = \frac{3a \cdot x^4}{4} + \frac{2b \cdot x^3}{3} + \frac{c \cdot x^2}{2} + C^{ste}$$

$$\int L(x) = \frac{a \cdot x^4}{4} + \frac{b \cdot x^3}{3} + \frac{c \cdot x^2}{2} + k \cdot x + C^{ste}$$

$$C^{ste} = 0$$

for x_i when $L(x_i) = 0$

$$-\frac{b \cdot x^3}{3} - c \cdot x^2 - 3k \cdot x + K^{ste} = \frac{3a \cdot x^4}{4} + \frac{2b \cdot x^3}{3} + \frac{c \cdot x^2}{2} = -\frac{a \cdot x^4}{4} - \frac{b \cdot x^3}{3} - \frac{c \cdot x^2}{2} - k \cdot x$$

when D is an integer

$$m_3 = 1$$

$$m_1 = -m_2 = \sqrt{\prod_i^n m_i}$$

For

$$L(x_i) = ax_i^4 + bx_i^3 + cx_i^2 + dx_i + k = 0$$

with D the discriminator and n the degree of the polynomial equation

$$\begin{aligned} D = {} & 256a^3k^3 - 192a^2bdk^2 - 128a^2c^2k^2 + 144a^2cd^2k - 27a^2d^4 \\ & + 144ab^2ck^2 - 6ab^2d^2k - 80abc^2dk + 18abcd^3 + 16ac^4k \\ & - 4ac^3d^2 - 27b^4k^2 + 18b^3cdk - 4b^3d^3 - 4b^2c^3k + b^2c^2d^2 \end{aligned}$$

$$\prod_i^n L'(x_i) = D$$

$$\prod_i^n m_i = \frac{D}{(ak)^{n-1}}$$

when D is an integer

$$m_4 = -1$$

$$m_1 = m_3 \neq m_2$$

3. Conclusion

In conclusion, it's possible to resolve with a hand pen all polynomial equations of *3* and *4* degree when applying new equations found with the hypothesis H_L.

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