Résumé

Introduction à l'analyse numérique

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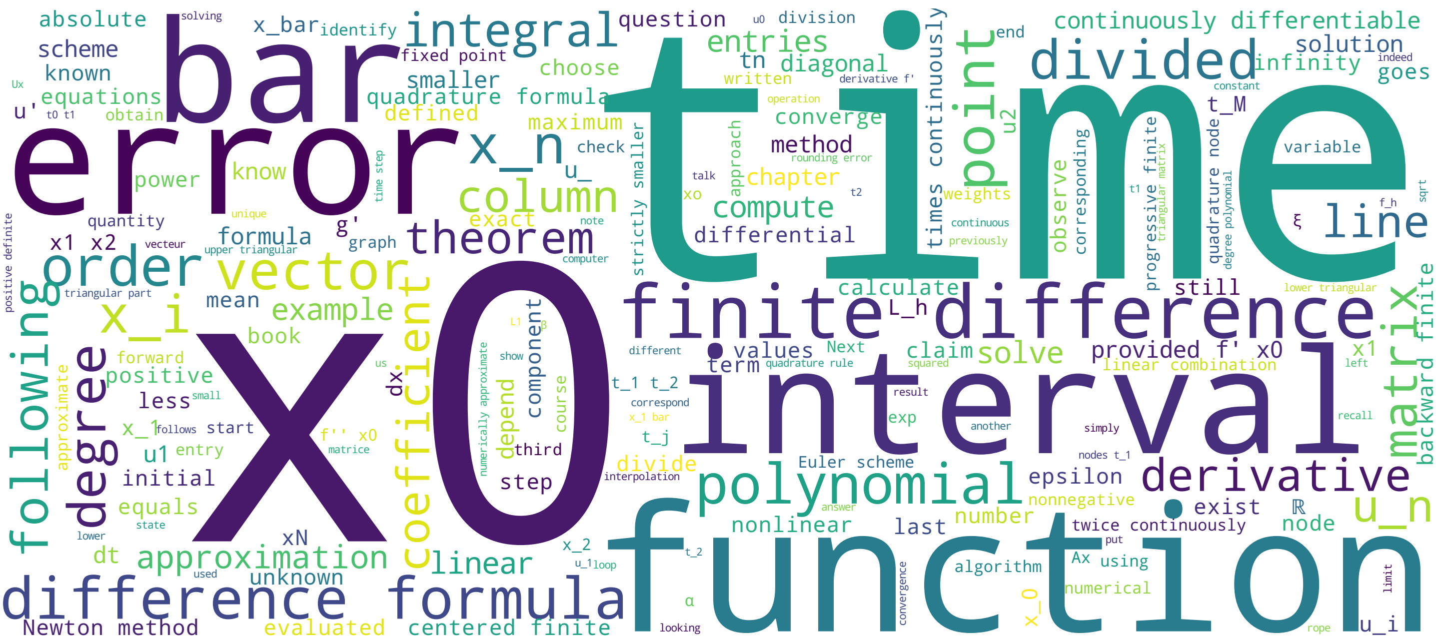


Video

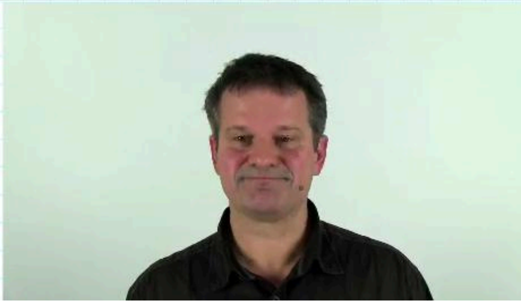
Chap 2 : Résumé

$$\left| f'(x_0) - \frac{f(x_0+h) - f(x_0)}{h} \right| = O(h) \qquad \text{FDF progr}$$

$$\left| f'(x_0) - \frac{f(x_0) - f(x_0-h)}{h} \right| = O(h) \qquad \text{FDF rétr.}$$

$$\left| f'(x_0) - \frac{f(x_0+h/2) - f(x_0-h/2)}{h} \right| = O(h^2) \qquad \text{FDF centrée}$$

$$\left| f''(x_0) - \frac{f(x_0-h) - 2f(x_0) + f(x_0+h)}{h^2} \right| = O(h^2) \qquad \text{FDF centrée}$$



The four finite difference formula to be known in this chapter are the following. First, the derivative f'(x0) can be approached by the progressive finite difference formula f(x0+h)-f(x0) divided by h. This formula is order one in h provided f is twice continuously differentiable. Same thing for the backward finite difference formula f(xo)-f(x0-h) divided by h, which is also of order one in h, provided f is twice continuously differentiable. Concerning the centered finite difference formula f(xo+h/2)-f(x0-h/2) divided by h, it is of order 2 in h, provided f is three times continuously differentiable. Finally, concerning the second derivative f''(x0), a division by h^2 occurs, take 2 f(x0) minus f(x0-h) plus f(x0+h), divide by h^2, the error is again of order h^2, provided f is 4 times continuously differentiable. Again progressive finite difference formula, backward finite difference formula, centered finite difference formula, again, centered finite difference formula.

Notes

Summary

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