

# MY ARTICLE

ZHOU FENG

## 1. INTRODUCTION

A good introduction to fractal geometry is Falconer [3]. There is `smallmatrix` environment (e.g,  $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ ). It is recommended to use  $\dots, \cdots, \cdots, \cdots, \dots$  instead of  $\dots$  and  $\cdots$ . Then we test the `\nobreakdash`:  $p$ -adic, page 1–9,  $n$ -dim, 1-dim,  $\sigma$ -algebra . What about a text-mode fractional:  $\frac{\log_k H}{1212}$ .

Then for the `\xleftarrow`:

$$(1.1) \quad A \xleftarrow{n+\mu-1} B \xrightarrow[T]{n\pm i-1\text{bla, bla, bla}} C \bigcap_{i\geq 1} A_i \bigcup_{k=1}^{100} \Upsilon_k$$

$$\Leftrightarrow$$

Compare the `\choose` and `\binom` :  $\binom{n}{k} \binom{n}{k}$ .  $|z|, \|v\|, \|v\|_\infty$ .

About the user-defined math operators:

$$\text{ex}(\text{conv}(A_i)) \text{abc} \text{Lim}_{x\rightarrow 0 \ n\rightarrow \infty}$$

Then the `\mod`:  $\gcd(n, m \bmod n)$ ;  $x \equiv y \pmod{b}, x \equiv y \pmod{c}, x \equiv y \pmod{d}$ .

See the following default math environments:

$$(1.2) \quad \vec{F} = m\vec{a}$$

$$\vec{F} = G \frac{m_1 m_2}{r^2}$$

$$(1.3a) \quad \nabla \cdot \vec{E} = \varepsilon_0 \rho$$

$$(1.3b) \quad \nabla \cdot \vec{B} = 0$$

$$(1.3c) \quad \nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$

$$(1.3d) \quad \nabla \times \vec{B} = \mu_0 \varepsilon_0 \vec{J} + \frac{\partial \vec{E}}{\partial t}$$

$$(1.4) \quad \begin{aligned} E &= \gamma m c^2 \\ \mathcal{R}_{\mu\nu} - \frac{\mathcal{R}}{2} g_{\mu\nu} + \Lambda g_{\mu\nu} &= \frac{8\pi G}{c^4} T_{\mu\nu} \end{aligned}$$

- `\substack{}` and `\begin{subarray}`

$$(1.5) \quad \lim_{\substack{0 \leq i \leq m \\ 0 \leq j \leq n}} P(i, j)$$

$$(1.6) \quad \sum_{\substack{i \in \Lambda \\ 0 \leq j \leq n}} P(i, j)$$

♡ `\sideset{text}{right}{symbol}`

$$a_0 + \frac{1}{a_1 + \frac{1}{a_2 + \frac{1}{a_3 + \cdots}}}$$

$$(1.7) \quad \left\{ \prod_{n=1}^{\infty} \left[ \prod_{n=1}^{\infty} \sum_{\text{ex}} \prod_{n=1}^{\infty} \right] \right\} \lim_{n \rightarrow \infty} \text{Quantum Computing}$$

The `\mathbf` command is commonly used to obtain bold Latin letters in math, but for most other kinds of math symbols it has no effect.

`\mid` and `\mathbin{}` :  $P(A \mid B)P(A \mid B)P(A|B)$

- (a) `f : X \to Y` vs. `f \colon X \to Y`:  $f : X \rightarrow Y$  vs.  $f : X \rightarrow Y$ .
- (b) `:=` vs. `\coloneqq` :  $:=$  vs.  $:=$ .
- (c)  $\{z : z \in \mathbb{Z}\}$  vs.  $\{z : z \in \mathbb{Z}\}$ .
- (d)  $v_1, v_2, \dots, v_n$  vs.  $v_1, \dots, v_n$ .
- (e)  $f(n) = O(n)$  vs.  $f(n)$  is  $O(n)$  or  $f(n) \in O(n)$ .
- (f)  $A \setminus B$  vs.  $A \backslash B$  vs.  $A - B$ .
- (g) There is a `\`, spacing between integrand and measure

$$\int_a^b x^2 dx$$

- (h) Use `Serre et al.` `\ proved`: Serre et al. proved.  
`Serre et al. proved`: Serre et al. proved.

- (i) `\text box` & `\math box`  $\mathbb{R}$ .

- (j) `\vv{AB}`  $\overrightarrow{AB}$  vs. `\overrightarrow{AB}`  $\overrightarrow{AB}$

- (k) `if...` statements:

- `\ifnum\value{num}>n {A} \else {B}\fi`: A
- `\ifodd\value{num} {A}\else {B}\fi`: B
- `\ifthenelse{(\NOT 4<2 \OR 4>11)\AND\isodd{4}}{A}{B}`: B

- (l) `loops`:

- `@for`: The sun is rising. The sun is setting.
- `@whilenum`: 1 Δ 3 Λ 5 Π 7 Υ 9 Ψ 11 ff 13 fl 15 ffi 17 j 19 ´
- `\loop...\repeat`: 1 † 2 ‡ 3 § 4 ¶ 5 || 6 \*\* 7 †† 8 ‡‡

Soft page break with `\pagebreak`

Here is some practical suggestions for mathematical writting.

- (1) The structures for conditional sentences: **If ... , then...**; **When...**, ...; **For ... , ...**. No **Let...**. **Then...**!
- (2) Avoid using **as** and **for** to introduce reasons after some conclusion.
- (3) **Hence**, **Thus**, and **Therefore**, .
- (4) , **so** is informal and should be used when the conclusion is short.
- (5) A statement that is **assumed** is an axiom, and throughout to be true. Something **supposed** is a hypothesis and more appropriate to introduce a case or an argument by contradiction. For example, **Suppose to the contrary that** and **Toward a contradiction, suppose that**.
- (6) No  $v$ 's or  $a_i$ 's.
- (7) No *nested* proof environments.
- (8) **We induct on n** vs. **We use induction on n**.
- (9) Prefer **pairwise** to **mutually**.
- (10) No contractions like **can't**, **won't**, etc.
- (11) Use `\begingroup\allowdisplaybreaks ... \endgroup` to allow the large chunk of math display environments to be broken into pages.
- (12) Replace `$$ ... $$` with `\[...]` in `sed`:  
`sed '/\$\$/{:x;N;/.*\$\$ *$/{!bx;s/\$\$(.*)\$\$ */\[\1\]/}'`
- (13) Use `\emph{}` over `\textit{}`
- (14) More built-in letters. Hebrew letters:  $\aleph_{\beth}$ ; Others:  $\nabla_{\varphi} \hbar \iota \jmath$

## 2. COMMUTATIVE DIAGRAMS

Arrows `@>>>` `@<<<` `@VVV` `@AAA`. Double lines: `@=`. Null arrows: `@`

$$(2.1) \quad \begin{array}{ccc} S^{\mathcal{W}_\Lambda \otimes T} & \xrightarrow{j} & T \\ \parallel & & \downarrow_{\text{End } P} \\ (S \otimes T)/I & \equiv & (Z \otimes T)/J \end{array}$$

`tikzcd` is the ultimate answer to a commutative diagram in  $\text{\TeX}$ .

$$\begin{array}{ccc} A & \xrightarrow{\phi} & B \\ & \searrow & \\ & & C \end{array}$$

Hard page break with `\newpage`

## 3. REFERENCE &amp; CITATION

Choose a natbib compatible `\bibliographystyle`, e.g. `abbrvnat`, `plainnat`.

- `\cite{}`: [1]
- `\citet{}`: Akiyama et al. [1]
- `\citet*{}`: Akiyama, Feng, Kempton, and Persson [1]
- `\citep{}`: [1]
- `\citep*{}`: [1]
- `\citealt*{}`: Akiyama, Feng, Kempton, and Persson 1
- `\citeyear{}`: 2020
- `\citeauthor{}`: Akiyama et al.
- `\citeauthor*{}`: Akiyama, Feng, Kempton, and Persson
- `\cite[text]{keylist}` [1, Theorem 1]
- `\cite[prefix][suffix]{keylist}`: [see e.g. 1, p.123]
- `\citenum{}`: 1
- `\citeyearpar{}`: [2020]
- `\citefullauthor{}`: Akiyama, Feng, Kempton, and Persson

See also a book Parry [6] and an arXiv preprint [5]. More multi-authors citation like Benoist and Quint [2] and Fan, Lau, and Rao [4].

*Remark 3.1.* For the use of `natbib` and format of arXiv preprint, it is recommended to use the `.bst` files `*nat.bst` or `*natDOI.bst` at

<https://github.com/zfengg/toolkit/tree/master/tex/bst>.

Otherwise, all the other default `bst` styles suffices.

## REFERENCES

- [1] S. Akiyama, D.-J. Feng, T. Kempton, and T. Persson. On the Hausdorff dimension of Bernoulli convolutions. *Int. Math. Res. Not. IMRN*, (19):6569–6595, 2020. 4
- [2] Y. Benoist and J.-F. Quint. *Random walks on reductive groups*, volume 62 of *Ergebnisse der Mathematik und ihrer Grenzgebiete. 3. Folge. A Series of Modern Surveys in Mathematics [Results in Mathematics and Related Areas. 3rd Series. A Series of Modern Surveys in Mathematics]*. Springer, Cham, 2016. 4
- [3] K. Falconer. *Fractal geometry*. John Wiley & Sons, Inc., Hoboken, NJ, second edition, 2003. Mathematical foundations and applications. 1
- [4] A.-H. Fan, K.-S. Lau, and H. Rao. Relationships between different dimensions of a measure. *Monatsh. Math.*, 135(3):191–201, 2002. 4
- [5] D.-J. Feng. Dimension of invariant measures for affine iterated function systems. *arXiv preprint arXiv:1901.01691*, 2020. 4
- [6] W. Parry. *Topics in ergodic theory*, volume 75 of *Cambridge Tracts in Mathematics*. Cambridge University Press, Cambridge-New York, 1981. 4

DEPARTMENT OF MATHEMATICS, THE CHINESE UNIVERSITY OF HONG KONG, SHATIN, HONG KONG

Email address: `zfeng@math.cuhk.edu.hk`