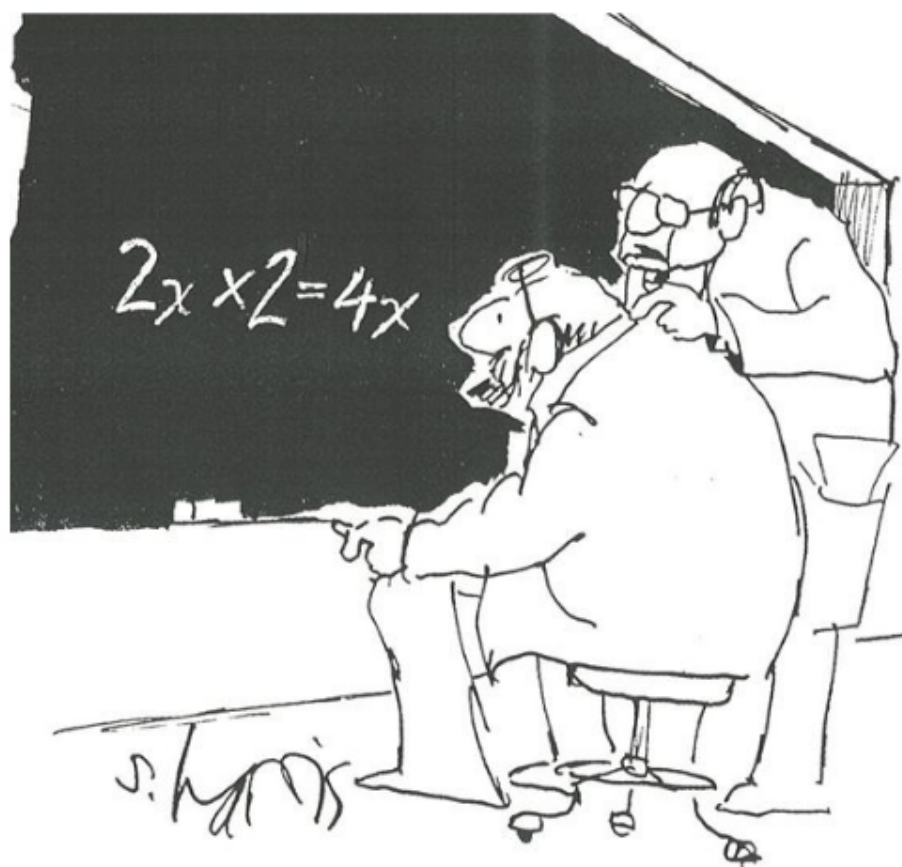


# EPSRC Centre for Doctoral Training in Industrially Focused Mathematical Modelling



"But Gershon, you can't call it Gershon's equation  
if everyone has known it for ages."

## Mini-project lay report

Oliver Sheridan-Methven



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# 1. Introduction

## Background information

Sator Arepo tenet  
opera rotas. Sator  
Arepo tenet opera  
rotas. Sator Arepo  
tenet opera rotas.

We can change the  
vertical spacing of  
these boxes using the  
optional command.  
(1em approximately  
corresponds to a line)

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

We can reference loads of useful stuff like Figures 1 and 2, and also Table 1.

| Quantity        | Name    | Value                 | Units                         |
|-----------------|---------|-----------------------|-------------------------------|
| Time            | Tenure  | 12                    | $\mu\text{s}$                 |
| Length          | Height  | 1.82                  | cm                            |
| Planks constant | $\hbar$ | $6.62 \cdot 10^{-32}$ | $\text{m}^2 \text{kg s}^{-1}$ |

Table 1 – Some useful values.

## Very specific points

In the margin I can mention  
something I need to do.

Pellentesque interdum sapien sed nulla. Proin tincidunt. Aliquam volutpat est vel massa. Sed dolor lacus, imperdiet non, ornare non, commodo eu, neque. Integer pretium semper justo. Proin risus. Nullam id quam. Nam neque. Duis vitae wisi ullamcorper diam congue ultricies. Quisque ligula. Mauris vehicula.

Incase I need to highlight something I need to do.

It's all about

$$\|I\|_{\infty}^4 = \frac{\partial^4 f}{\partial g^4} := x^2 + y^2 = z^2. \quad (1)$$

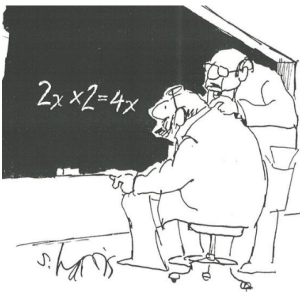
## Glossary of terms

- **Cartoon:** A brilliant sketch.
- **Lay report:** A smaller version of the technical report without all the maths.
- **InFoMM:** A great way to get a PhD and change the world.
- **Something a bit odd:** Sator Arepo tenet opera rotas. Sator Arepo tenet opera rotas. Sator Arepo tenet opera rotas. Sator Arepo tenet opera rotas. Sator Arepo tenet opera rotas.

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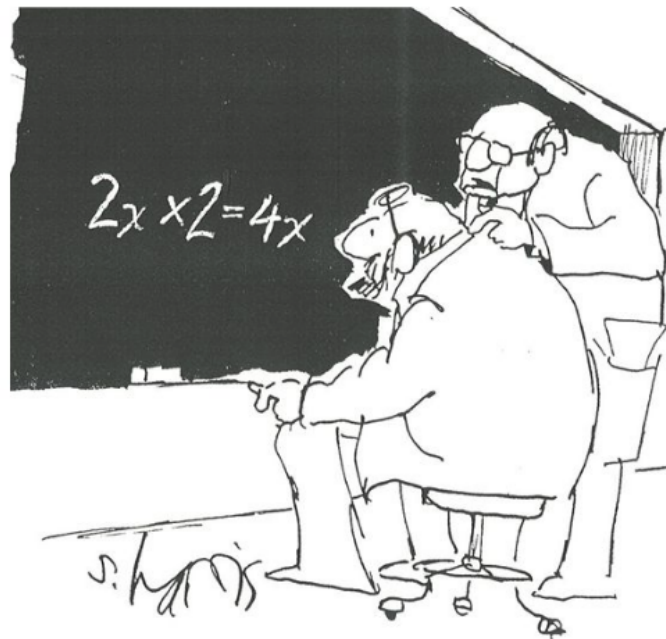
|         | Value                 | Units                         |
|---------|-----------------------|-------------------------------|
| c       | $3 \cdot 10^3$        | $\text{m s}^{-1}$             |
| $\hbar$ | $6.62 \cdot 10^{-32}$ | $\text{m}^2 \text{kg s}^{-1}$ |

Table 2 – Some physical constants which frequently come in handy for calculations, (although InFoMM students always non-dimensionalise).



"But Gershon, you can't call it Gershon's equation if everyone has known it for ages."

**Figure 1 – He is my favourite cartoonist.**



"But Gershon, you can't call it Gershon's equation if everyone has known it for ages."

**Figure 2 – A hilarious S. Harris cartoon. Here  $e = mc^2$  or  $e = mc^2$ .**

### An odd point

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I love these side bubbles! They're awesome and very helpful.

$$\int_{\mathbb{R}}^{\infty+} f(z) d(z) = 0$$

## 1. Some crazy maths

Code 1 is a nice example of using Python rather than Matlab.



```

1 def prime_numbers():
2     """
3     A prime number generator.
4     :return: Int, prime number.
5     """
6     x = 2
7     primes = [x]
8     yield x # We the first prime number.
9     while True:
10        if x in primes:
11            x += 1
12        else:
13            is_prime = True
14            for p in primes:
15                if x % p == 0:
16                    is_prime = False # The number is not prime.
17                    x += 1
18                    break # We do not need further checks.
19            if is_prime:
20                primes.append(x)
21            yield x

```

**Code 1 – Some example python code, incase we wanted to show the company some awesome programming idea.**

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$$\bar{x} = \frac{1}{n} \sum_{i=1}^{i=n} x_i = \frac{x_1 + x_2 + \dots + x_n}{n}$$

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$$\int_0^{\infty} e^{-\alpha x^2} dx = \frac{1}{2} \sqrt{\int_{-\infty}^{\infty} e^{-\alpha x^2} dx} \int_{-\infty}^{\infty} e^{-\alpha y^2} dy = \frac{1}{2} \sqrt{\frac{\pi}{\alpha}}$$

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dictum turpis accumsan semper.

$$\sum_{k=0}^{\infty} a_0 q^k = \lim_{n \rightarrow \infty} \sum_{k=0}^n a_0 q^k = \lim_{n \rightarrow \infty} a_0 \frac{1 - q^{n+1}}{1 - q} = \frac{a_0}{1 - q}$$

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$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-p \pm \sqrt{p^2 - 4q}}{2}$$

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$$\frac{\partial^2 \Phi}{\partial x^2} + \frac{\partial^2 \Phi}{\partial y^2} + \frac{\partial^2 \Phi}{\partial z^2} = \frac{1}{c^2} \frac{\partial^2 \Phi}{\partial t^2}$$

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## 1. Discussion, conclusions & recommendations

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For general quotes use:

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Caesar, head of the Roman empire.

While for the final company quote use:

[Insert name], [Job title + company] said: "Sator Arepo tenet opera rotas. Sator Arepo tenet opera rotas. Sator Arepo tenet opera rotas. Sator Arepo tenet opera rotas. Sator Arepo tenet opera rotas. Sator Arepo tenet opera rotas."



## 1. References

- [1] Thomas Bradley, Jacques du Toit, Robert Tong, Mike Giles, and Paul Woodhams. Parallelization techniques for random number generations. *GPU Computing Gems Emerald Edition*, 16:231–246, 2011.
- [2] Nigel Stephens, Stuart Biles, Matthias Boettcher, Jacob Eapen, Mbou Eyole, Giacomo Gabrielli, Matt Horsnell, Grigorios Magklis, Alejandro Martinez, Nathanael Premillieu, Alastair Reid, Alejandro Rico, and Paul Walker. The arm scalable vector extension. *IEEE Micro*, 37(2):26–39, 2017.
- [3] Akihiro Musa, Yoshiei Sato, Takashi Soga, Ryusuke Egawa, Hiroyuki Takizawa, Koki Okabe, and Hiroaki Kobayashi. Effects of mshr and prefetch mechanisms on an on-chip cache of the vector architecture. In *Parallel and Distributed Processing with Applications, 2008. ISPA'08. International Symposium on*, pages 335–342. IEEE, 2008.

## 2. COMMENTS ON THE REPORT

For the **final** editing:

- Ensure the side bubbles are correctly centred and don't spill over any pages.
- Ensure there are no dangling headers (This might require inserting a `\clearpage` command.)