

# Joint Research of Optics and Fluid Interface

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Subject Index      xxx, xxx

## 1 Setup

Let  $\Delta$  be the total width the light travels with path not being straight, hence:

$$\forall x \notin [-\frac{\Delta}{2}, \frac{\Delta}{2}] : \frac{d^2}{dx^2}y = 0 \quad (1)$$

Now define the light ray incoming from left-hand side towards right-hand side and (suppose transition layers' width approaches zero) refracts at origin. And let  $h$  be the thickness of the transition layers.

Now let's assume the incoming transition layer has the same thickness as outbounding transition layer, hence we get:

$$\Delta = \frac{h}{2}(\tan \theta_{in} + \tan \theta_{out}) \quad (2)$$

Now we can first confirm our path function is a function of  $\theta_{in}, \theta_{out}, h$

$$P(\theta_{in}, \theta_{out}, h) = \quad (3)$$

## 2 Finding path

### 2.1 Constructing Layers

Let function  $v(\theta_{in}, \theta_{out}, \Delta, \delta)$  be the velocity of layer  $\delta$  (from the entry interface), whose entry velocity is  $\theta_{in}$ , exit velocity is  $\theta_{out}$ , and the whole layer thickness is  $\Delta$ .<sup>1</sup>

$$a = v(x, y, \beta - \alpha, \alpha) \tag{4a}$$

$$b = v(x, y, \beta - \alpha, \beta) \tag{4b}$$

$$\alpha \leq \beta \tag{4c}$$

Let  $a = v(x, y, \alpha)$  and  $b = v(x, y, \beta)$  ( $\alpha \leq \beta$ ),  $\forall p \in [\alpha, \beta] : v(a, b, p - \alpha) = v(x, y, p)$

### 2.2 Fractal Structure

Let  $P(\theta_{in}, \theta_{out}, h)$  be the path taken (5)

$$P(\theta_{in \rightarrow \alpha}, \alpha) = P(\theta_{in}, \theta_{\alpha}) \tag{6}$$

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<sup>1</sup> Here we suppose every layer paraelles

### 3 Regarding Special Relativity

So first let the real velocity  $v$ , whom maintains the linear properties of traditional non-relativistic velocity.

Linear to non-linear (relativistic) velocity:

$$v_S = \frac{v_{\mathfrak{I}} \mathfrak{I}_S^{\mathfrak{I}}}{\mathfrak{I}_S S} = v_{\mathfrak{I}} \mathfrak{I}_S^{\mathfrak{I}} \quad (7)$$

#### 3.1 Constant force/acceleration

Let a point located at origin, with initial velocity  $v(0) = 0$ .

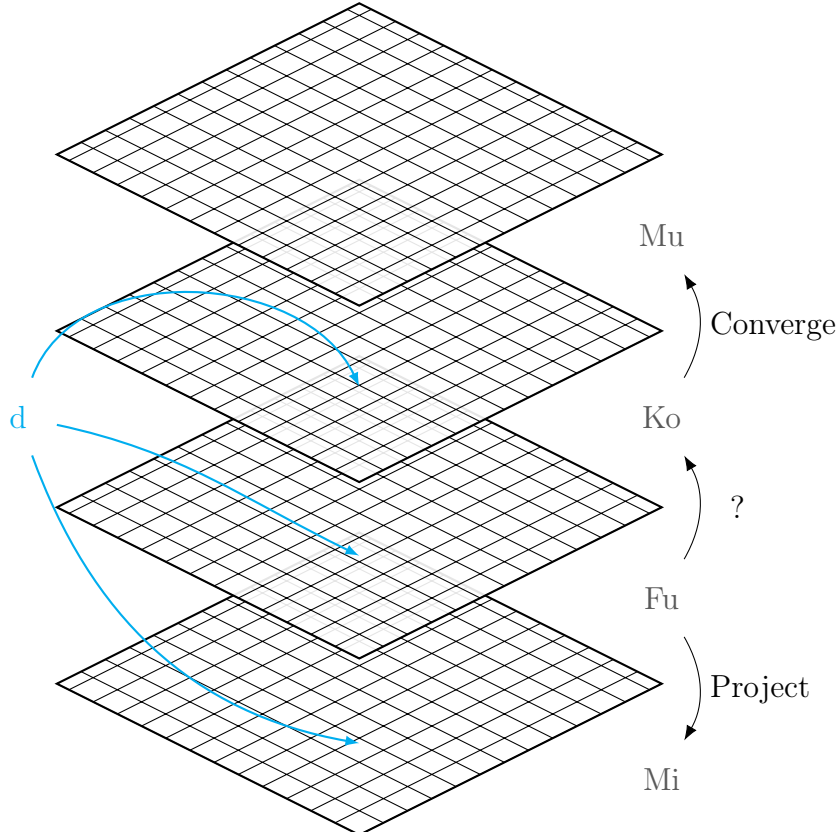
$$a_{\mathfrak{I}}(v, F, m_{rest}) = \frac{F}{m_{rest}} \sqrt{1 - \frac{v^2}{c^2}}^3 \quad (8a)$$

$$a_{\mathfrak{I}}(t) = k \quad (8b)$$

$$v_{\mathfrak{I}}(t) = v_{\mathfrak{I}} \mathfrak{I}_S^{\mathfrak{I}} = kt \mathfrak{I}_S^{\mathfrak{I}} \quad (8c)$$

$$v_{\mathfrak{I}}(t) = \int \frac{F}{m_{rest}} \sqrt{1 - \frac{v_{\mathfrak{I}}(t)^2}{c^2}}^3 \quad (8d)$$

### 4 Model of Particles



## 5 Conclusion

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## Acknowledgment

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## References

- [1] [https://www.mail-archive.com/dou-geometry@googlegroups.com/msg00004/\\_\\_\\_\\_\\_.docx](https://www.mail-archive.com/dou-geometry@googlegroups.com/msg00004/_____.docx)

## A Appendix head