/* Transmembrane potential acorss the axonal membrane,
in an unmyelinated axons that is exposed to a tranverse electric field * /

/ Step 1 : Vm for the myelinated axon can be further siplified for the unmyelinated axon,
if we assume S1 = S0, and S2 = S0. * /

```
Vm = (8 a^2 b^2 c (c - d) E0 S0 S1 S2 (d (-S3 + S4) + c (S3 + S4)) Cos[θ]) /
  (b^2 (S0 - S1) (c^2 (S1 + S2) (d^2 (S2 + S3) (S3 - S4) + c^2 (S2 - S3) (S3 + S4)) +
      b^2 (S1 - S2) (d^2 (S2 - S3) (S3 - S4) + c^2 (S2 + S3) (S3 + S4))) +
    a^2 (S0 + S1) (c^2 (S1 - S2) (d^2 (S2 + S3) (S3 - S4) + c^2 (S2 - S3) (S3 + S4)) +
      b^2 (S1 + S2) (d^2 (S2 - S3) (S3 - S4) + c^2 (S2 + S3) (S3 + S4))))
```

$$\left(8 a^2 b^2 c (c-d)\, E0\, S0\, S1\, S2\, (d(-S3+S4)+c(S3+S4)) \mathrm{Cos}[\theta]\right) \Big/ \Big(b^2 (S0-S1)\left(c^2 (S1+S2)\left(d^2 (S2+S3)(S3-S4)+c^2 (S2-S3)(S3+S4)\right) + b^2 (S1-S2)\left(d^2 (S2-S3)(S3-S4)+c^2 (S2+S3)(S3+S4)\right)\right) + a^2 (S0+S1)\left(c^2 (S1-S2)\left(d^2 (S2+S3)(S3-S4)+c^2 (S2-S3)(S3+S4)\right) + b^2 (S1+S2)\left(d^2 (S2-S3)(S3-S4)+c^2 (S2+S3)(S3+S4)\right)\right)\Big)$$

```
S1 = S0
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S0

```
S2 = S0
```

S0

```
Vm
```

$$\frac{2 c (c-d)\, E0\, S0\, (d(-S3+S4)+c(S3+S4)) \mathrm{Cos}[\theta]}{d^2 (S0-S3)(S3-S4)+c^2 (S0+S3)(S3+S4)}$$

/* Step 2 : Validation,
Transmembrane potential shall be zero if the membrane has zero thickness * /

```
c = d
```

d

```
Vm
```

0