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*Electromagnetics Vol. 1*

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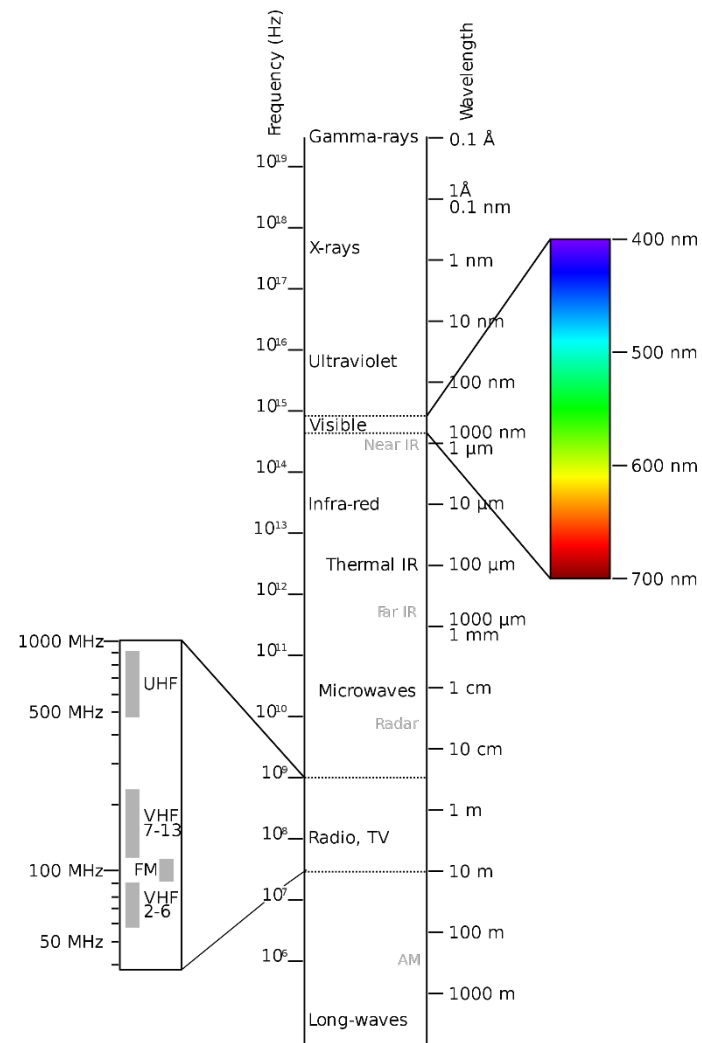


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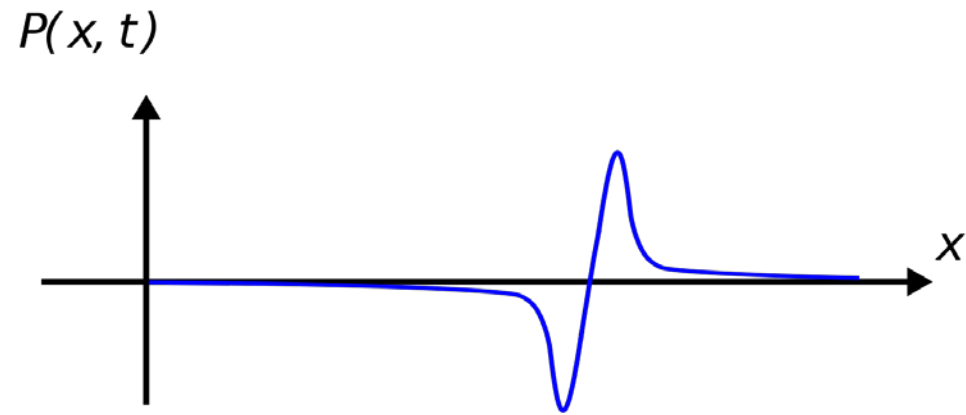
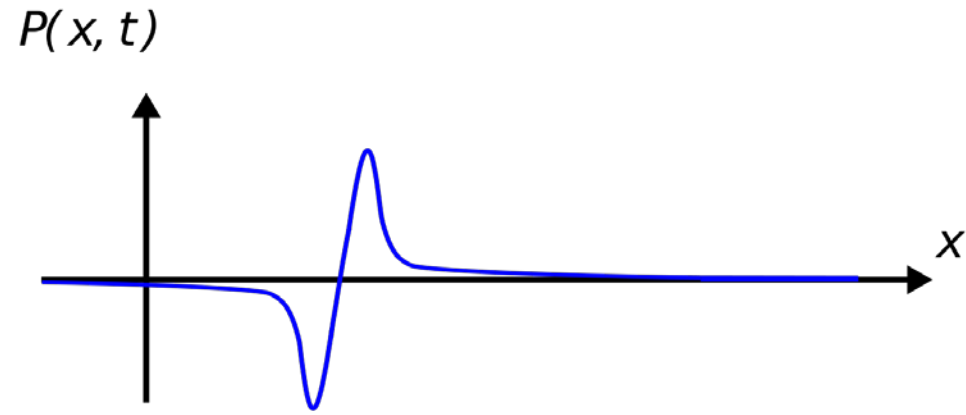


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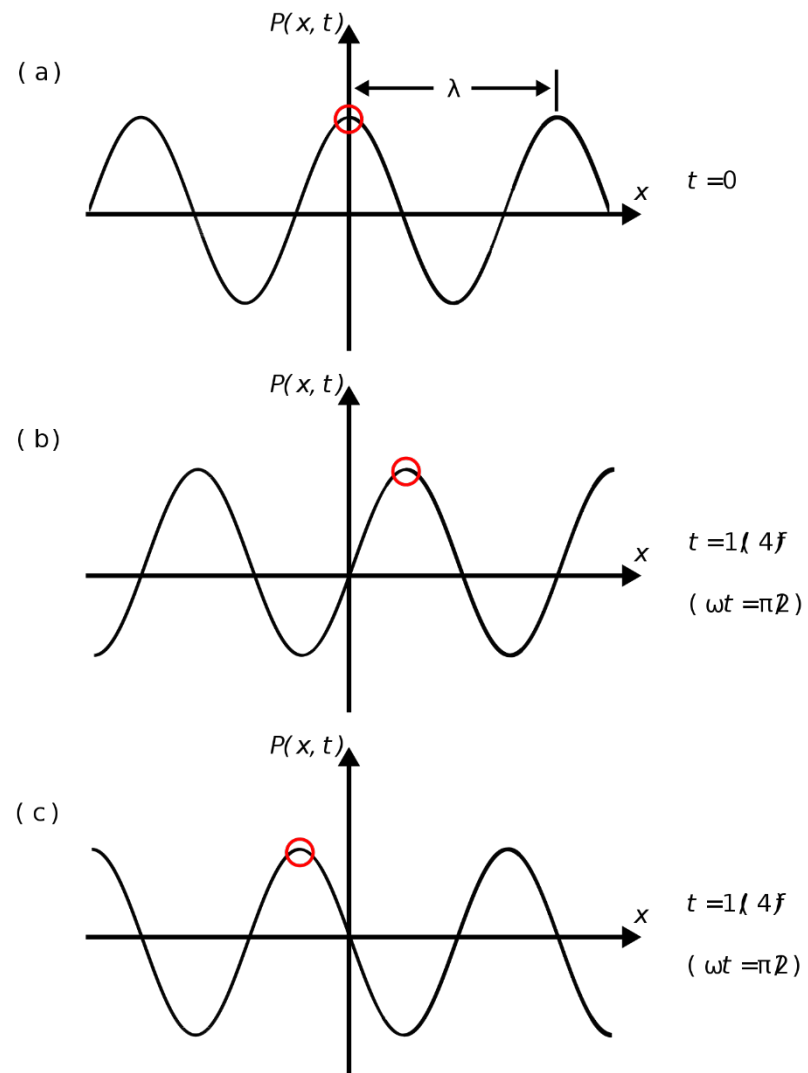


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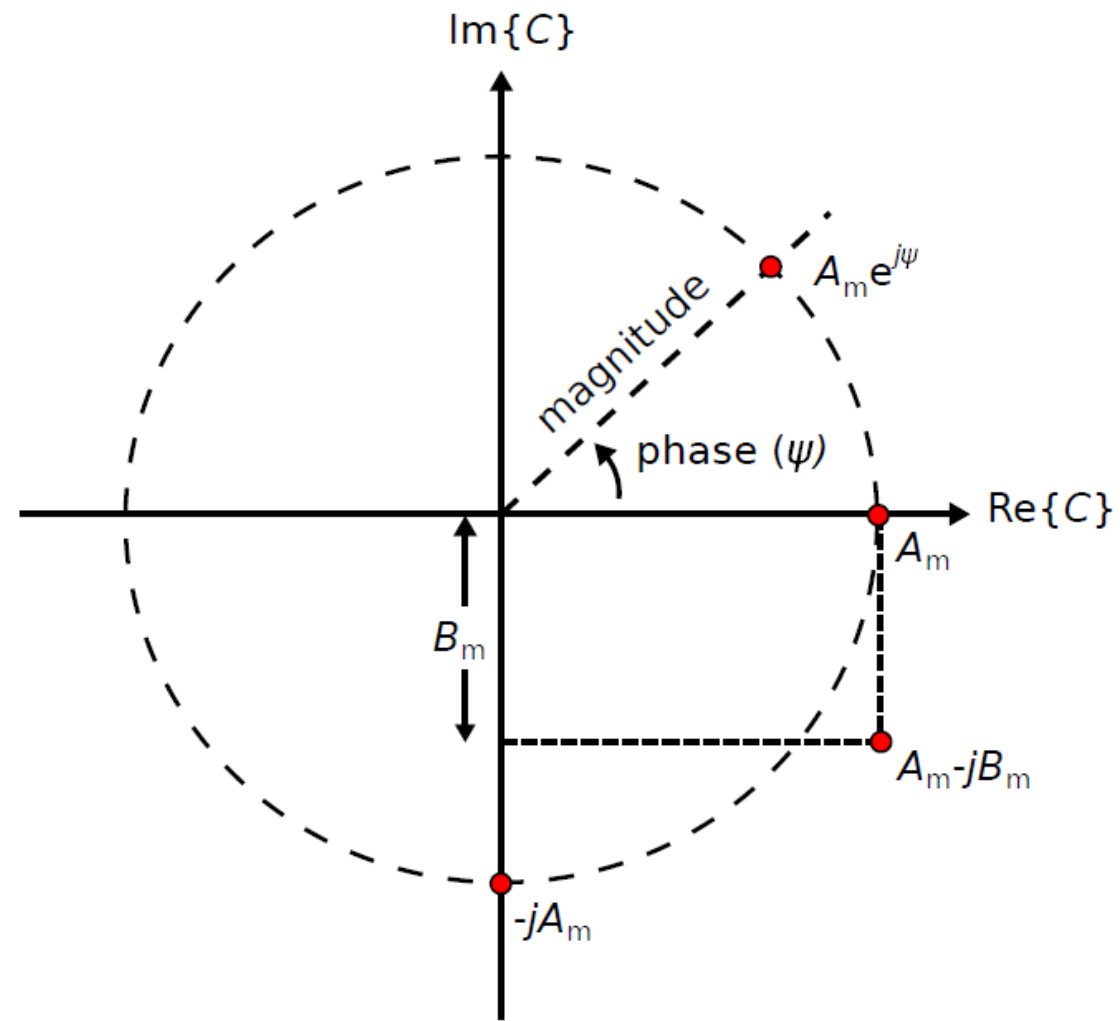


Fig. 1.4

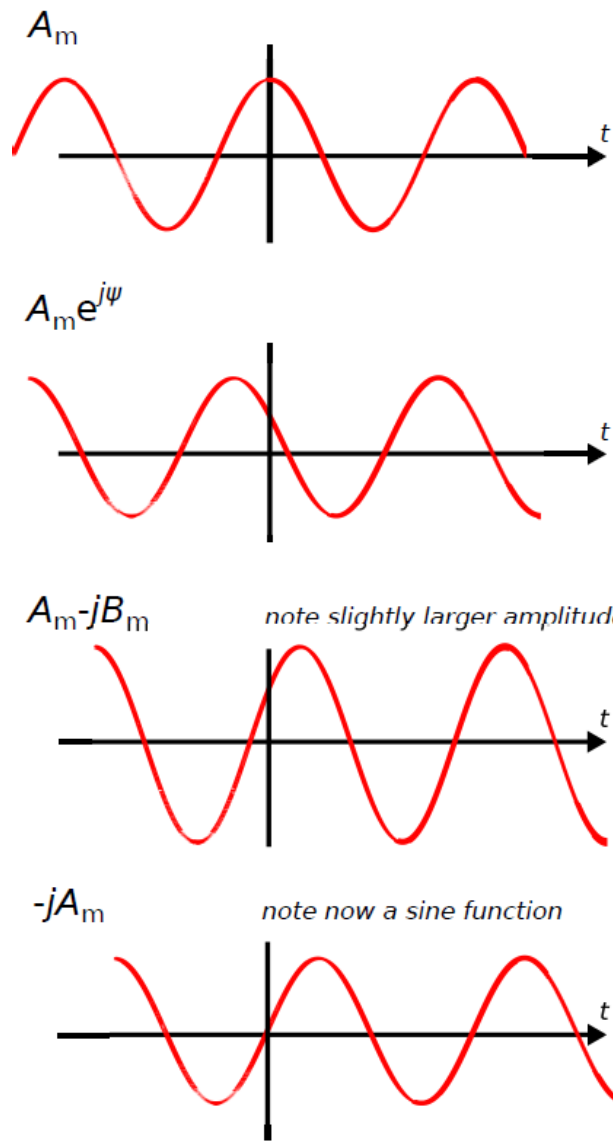


Fig. 1.5

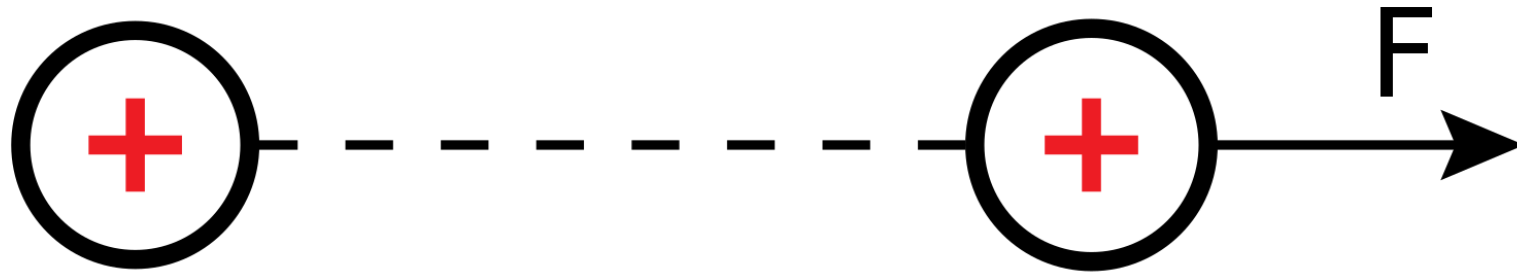


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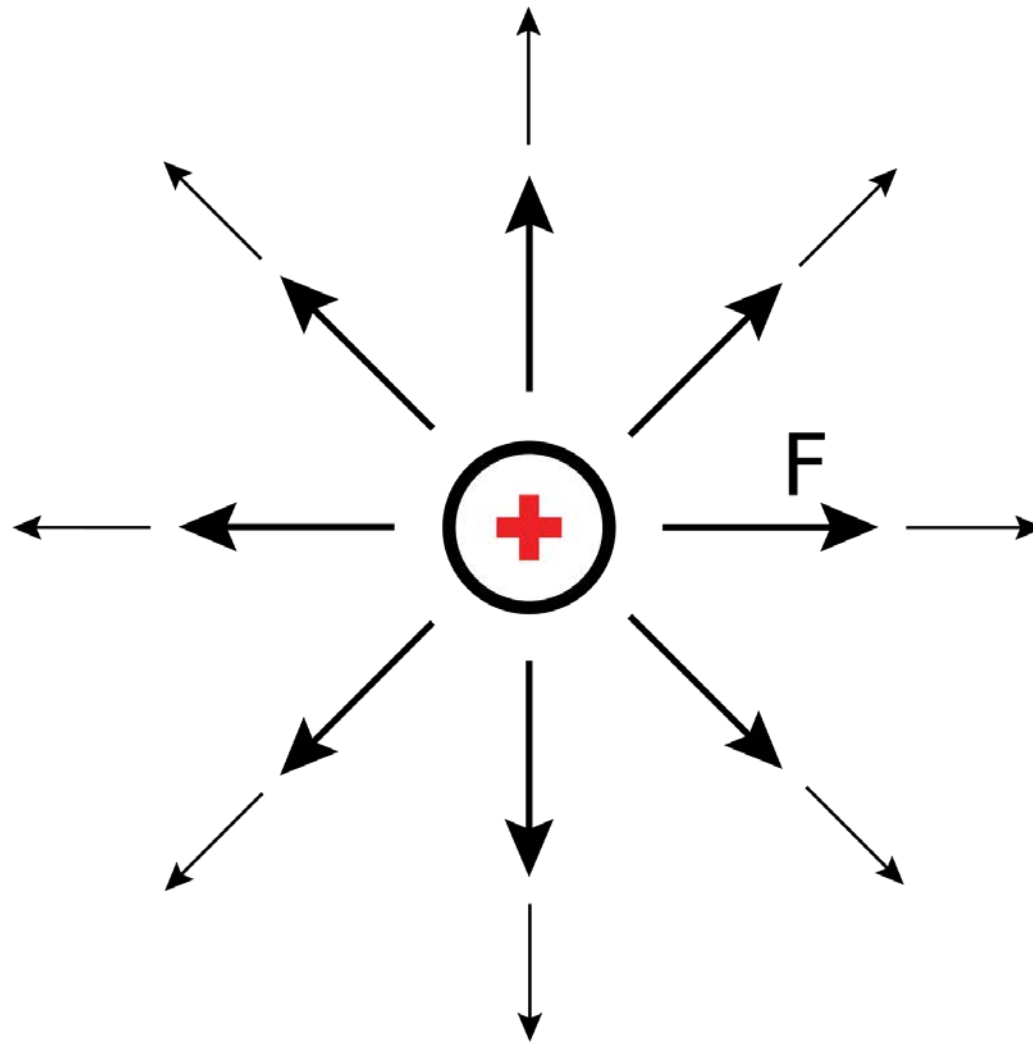


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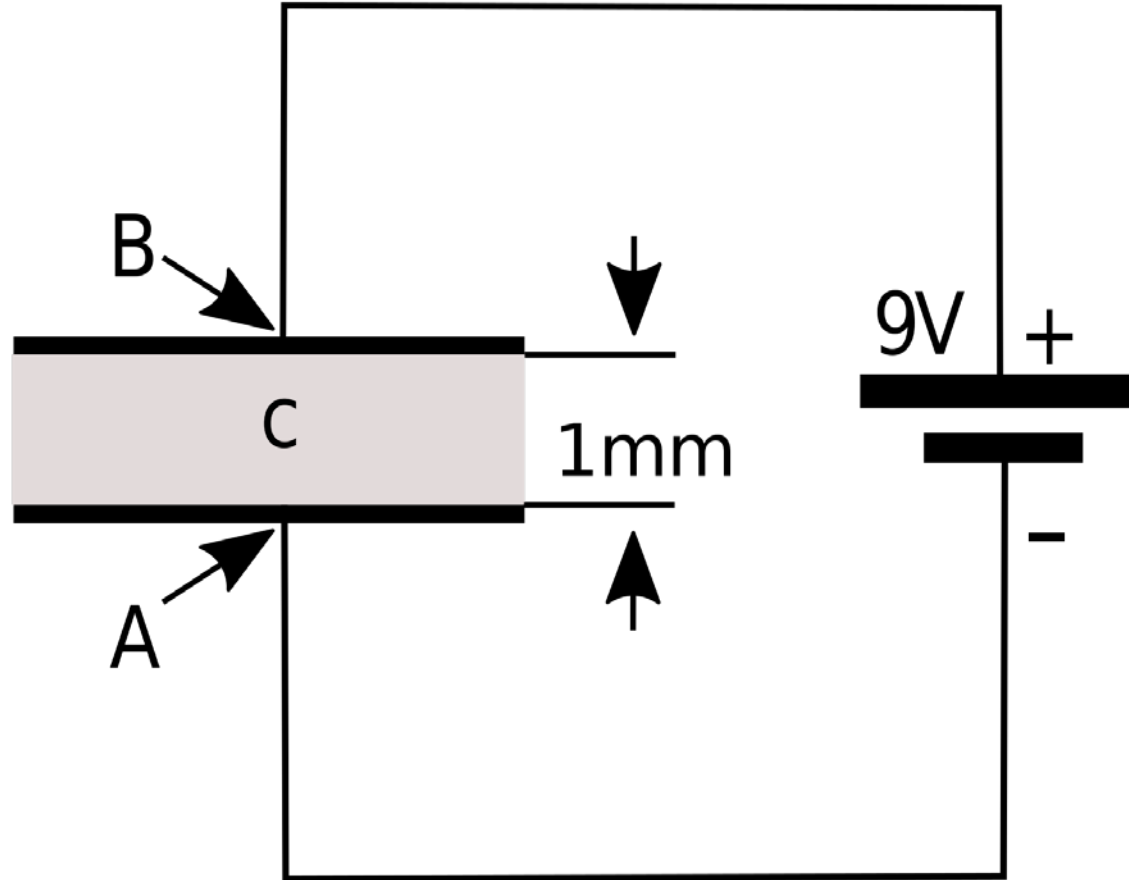


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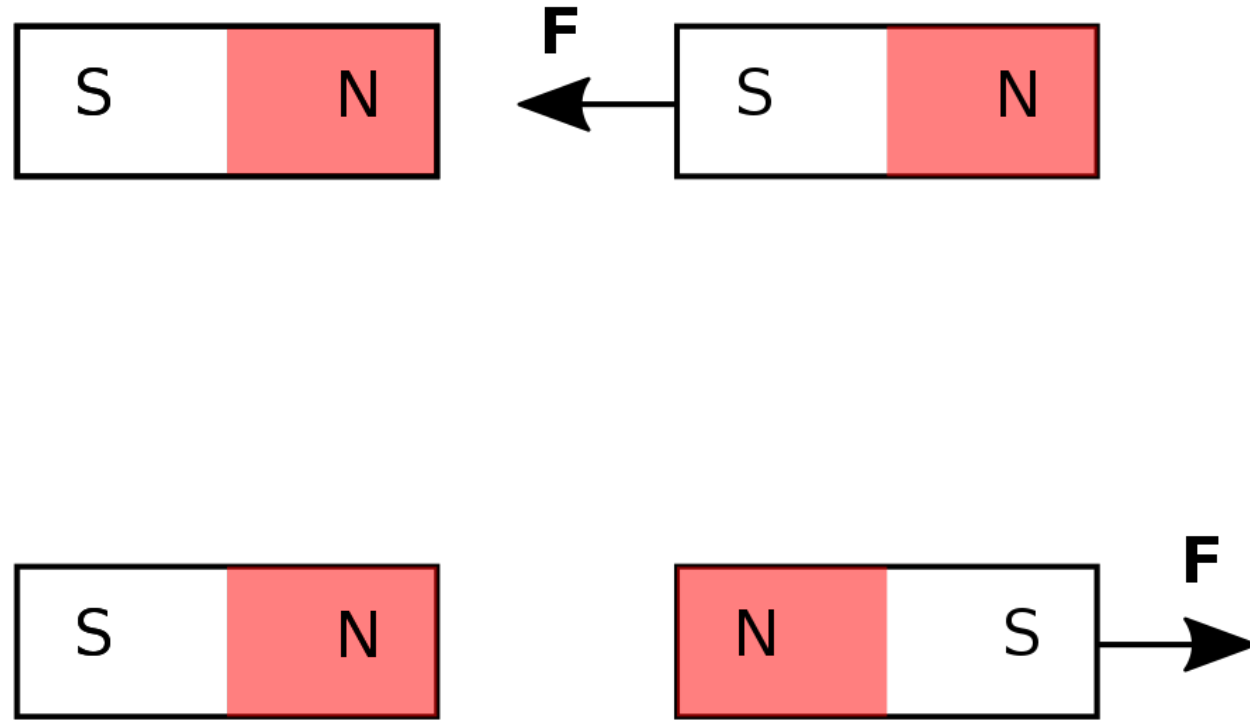


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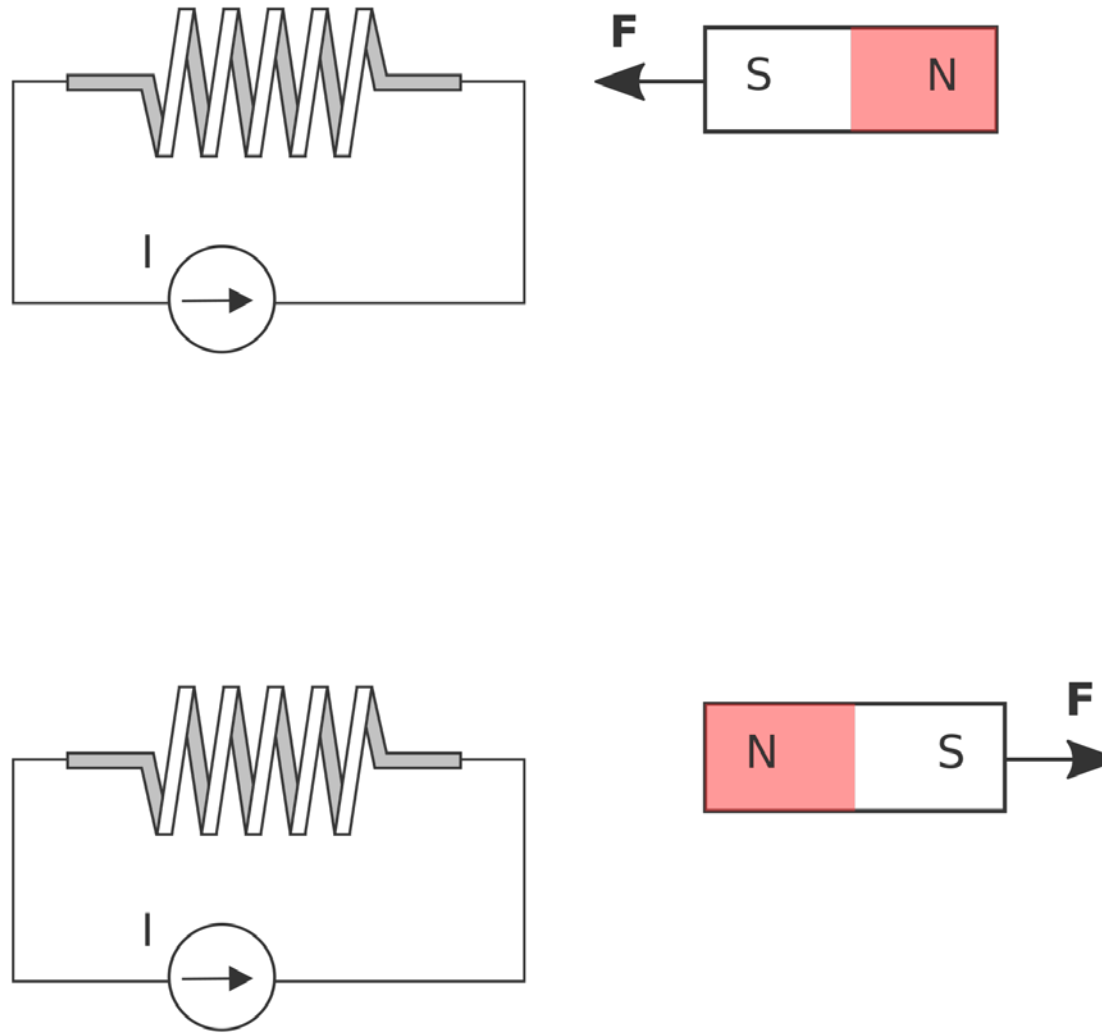


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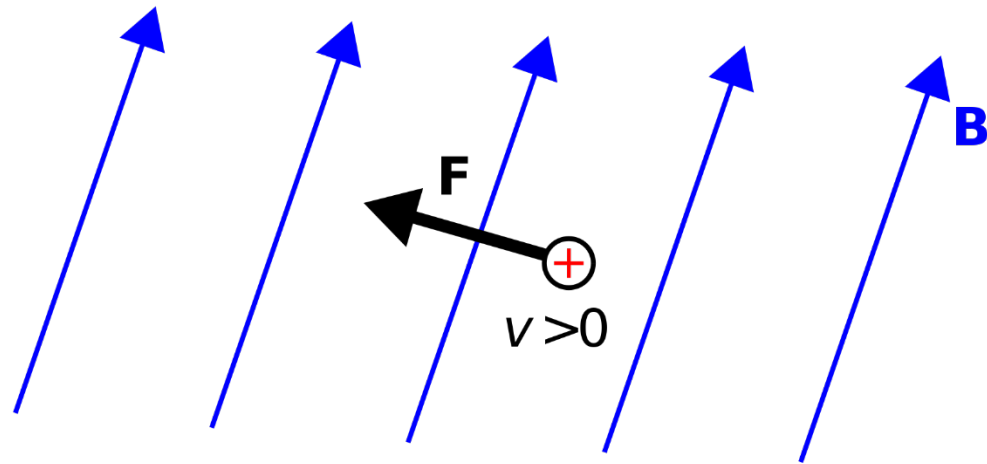
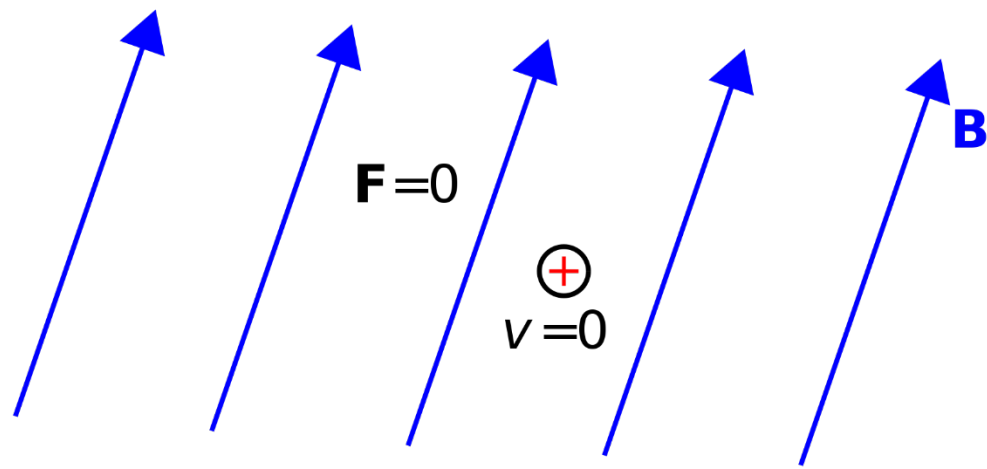


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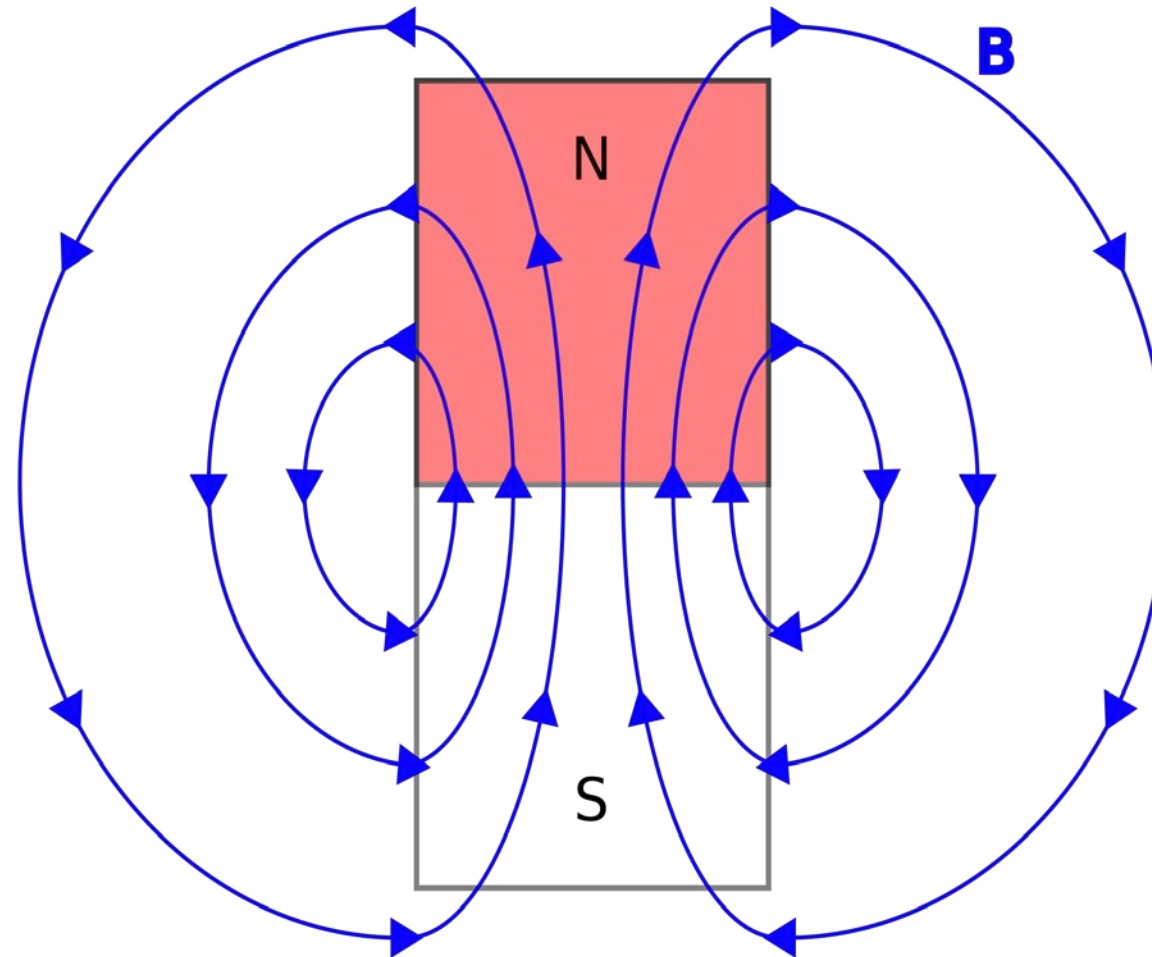


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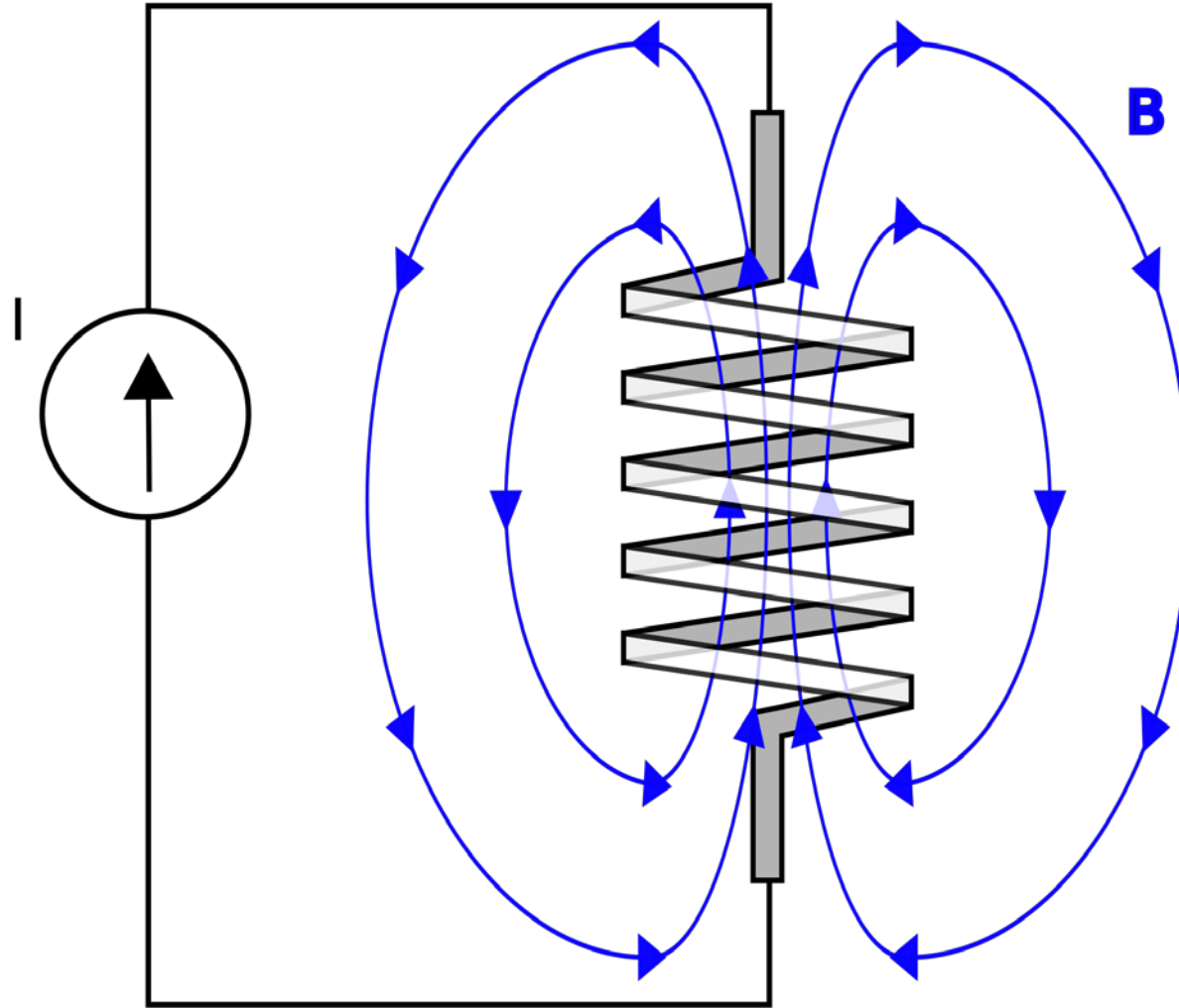


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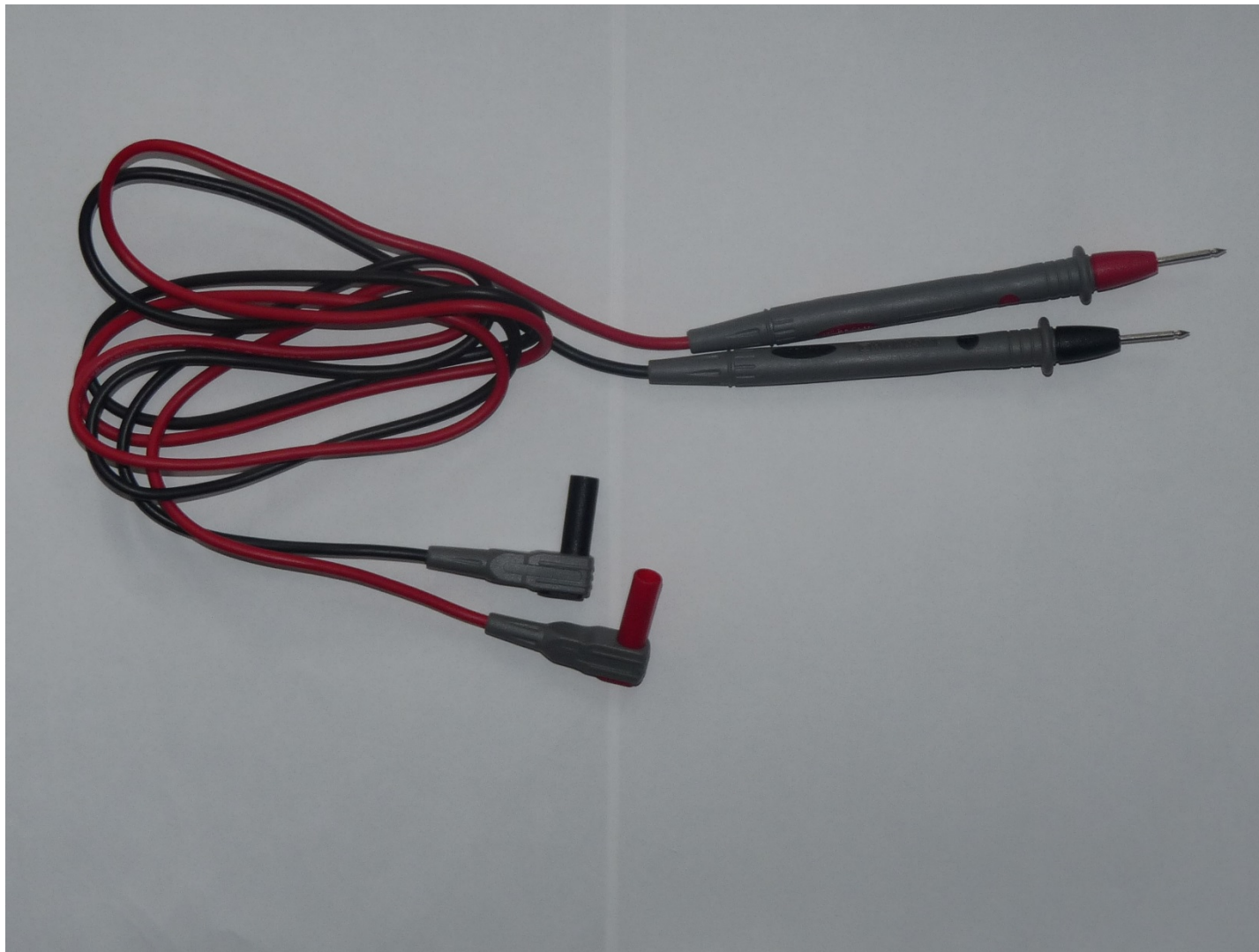


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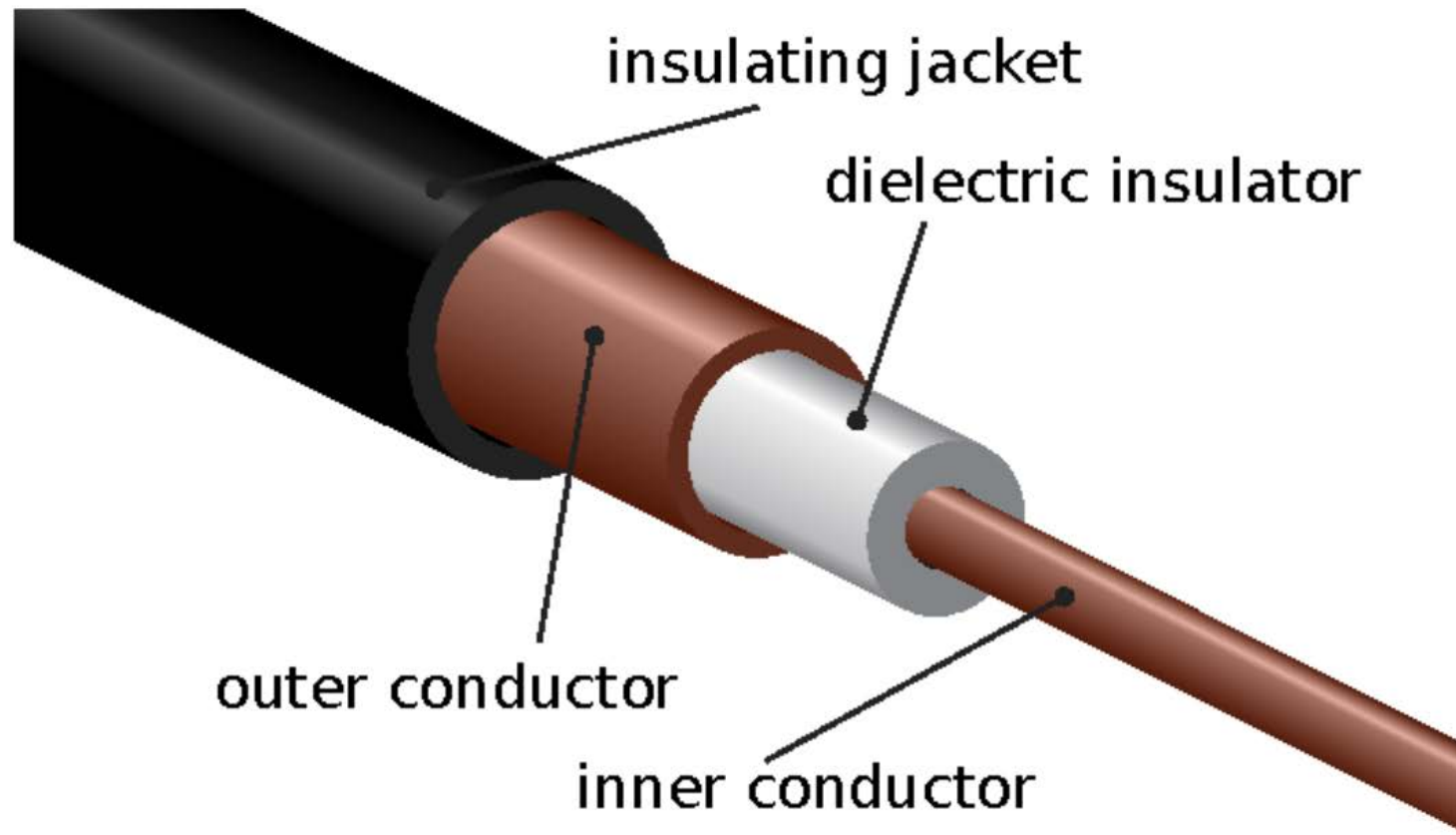


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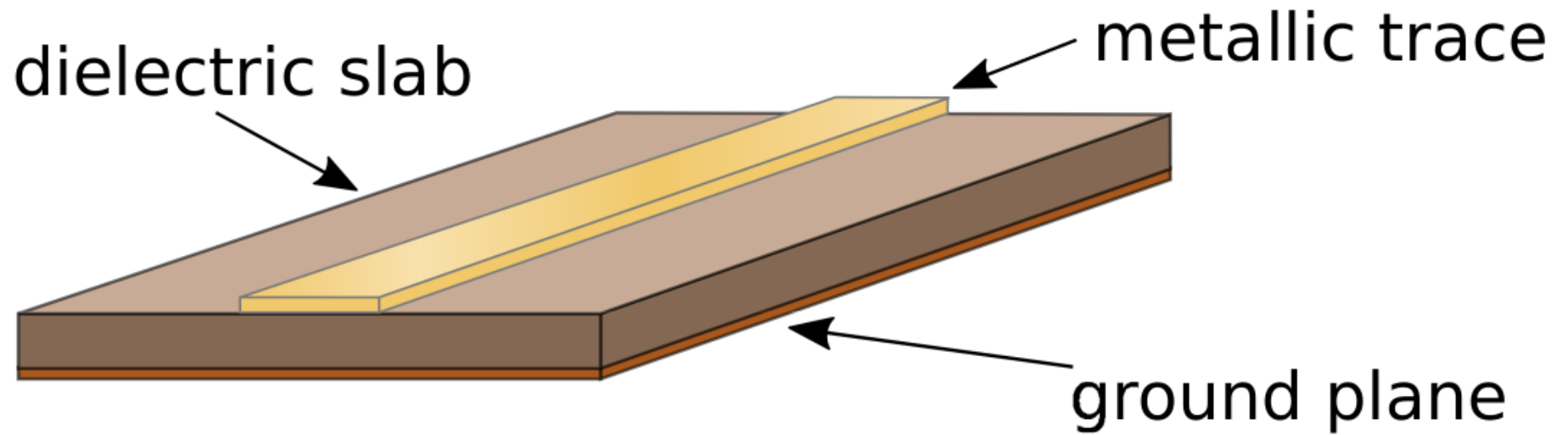


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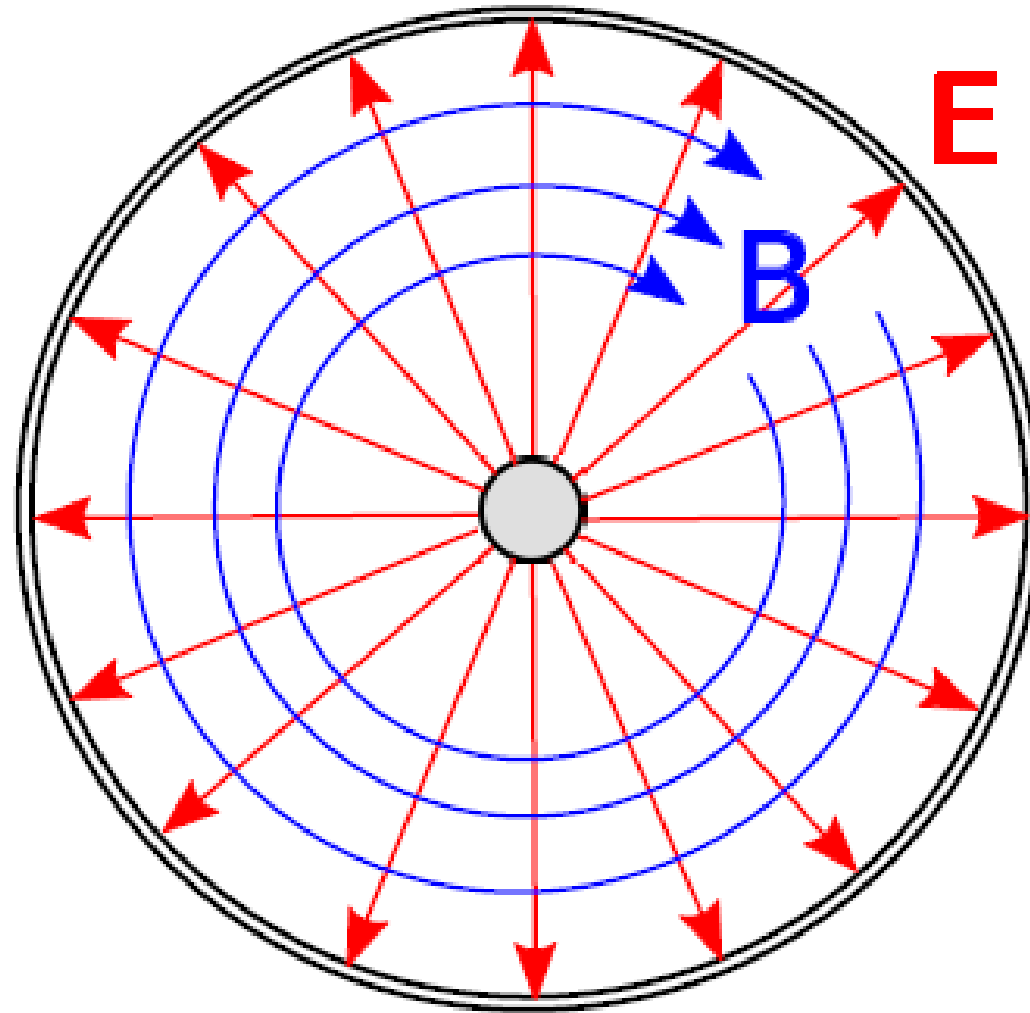


Fig. 3.4

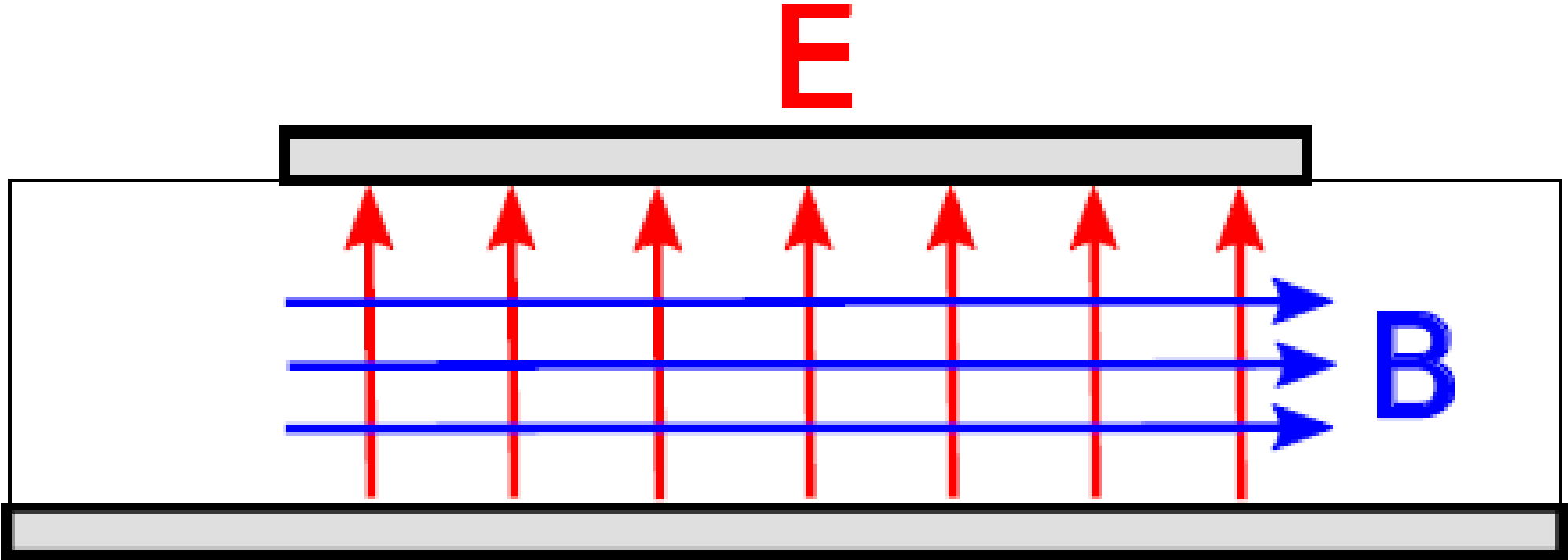


Fig. 3.5

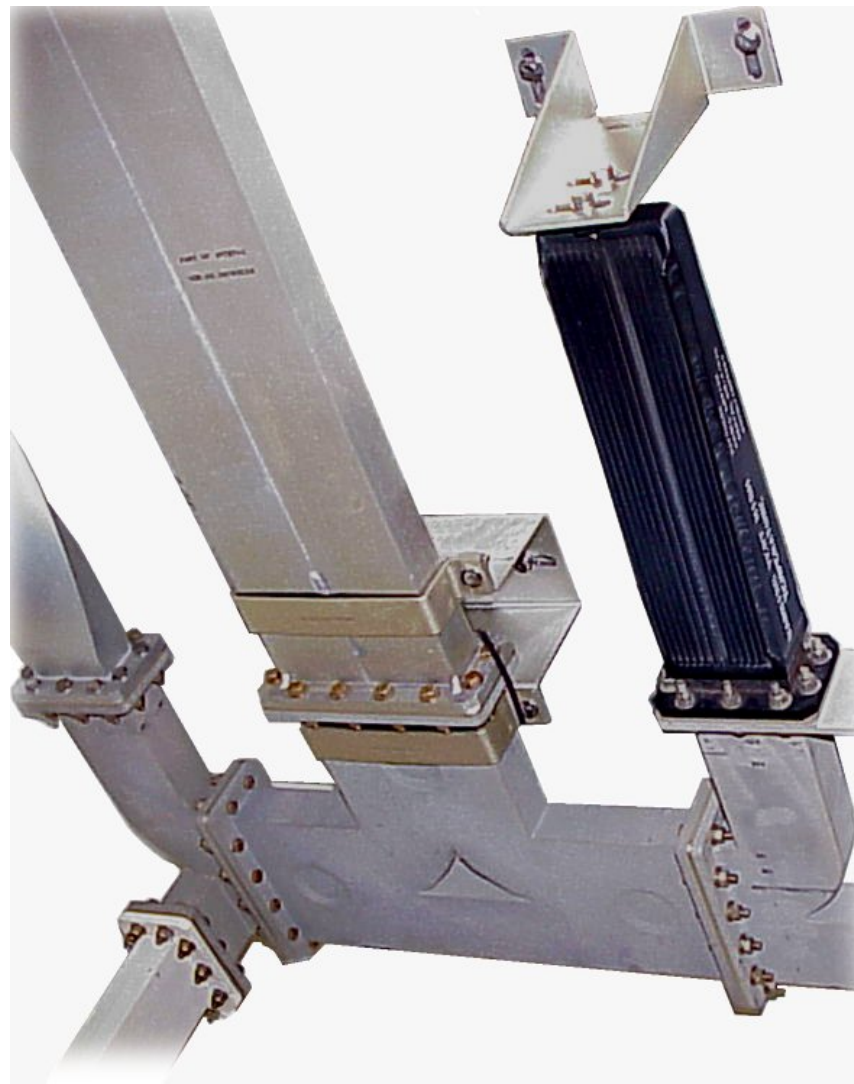


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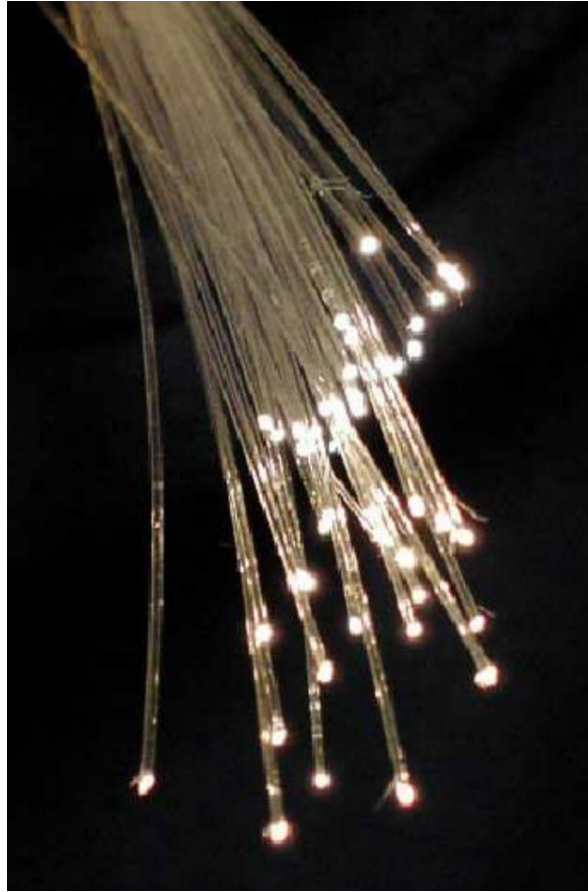


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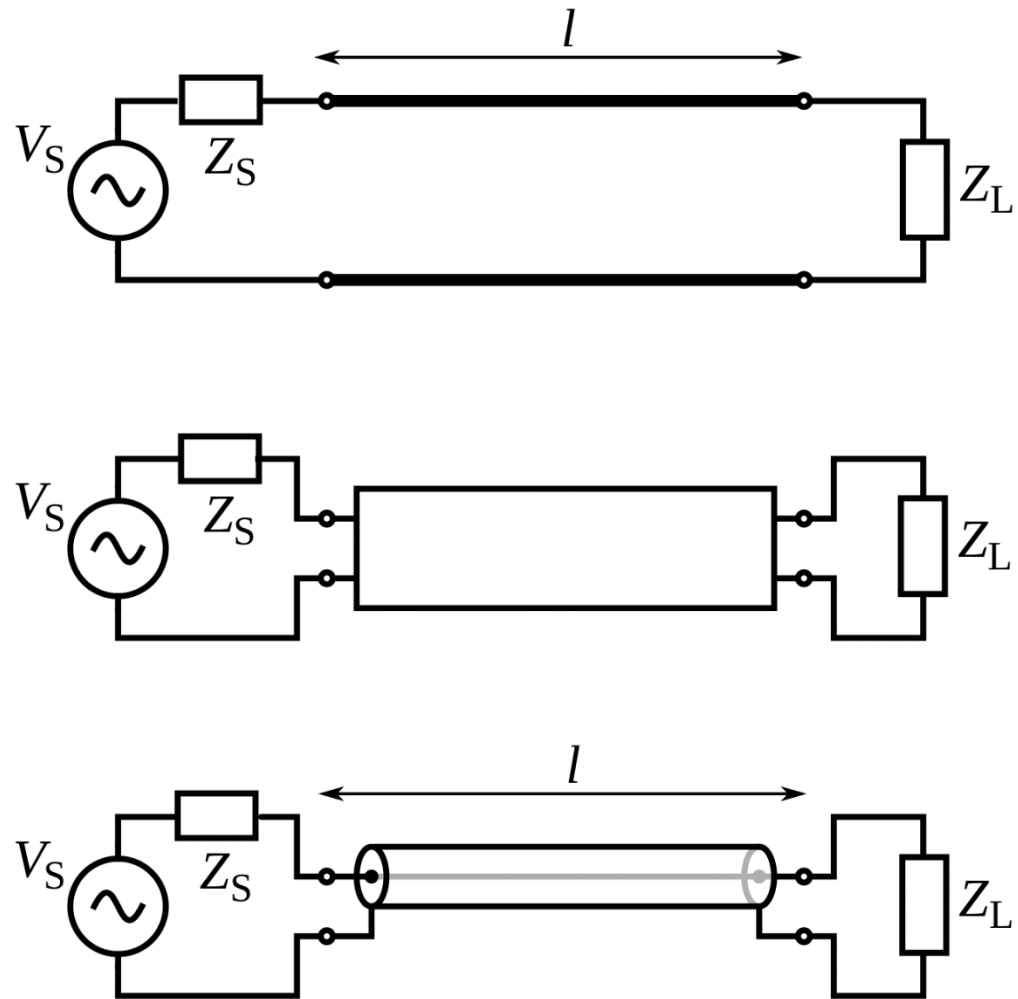


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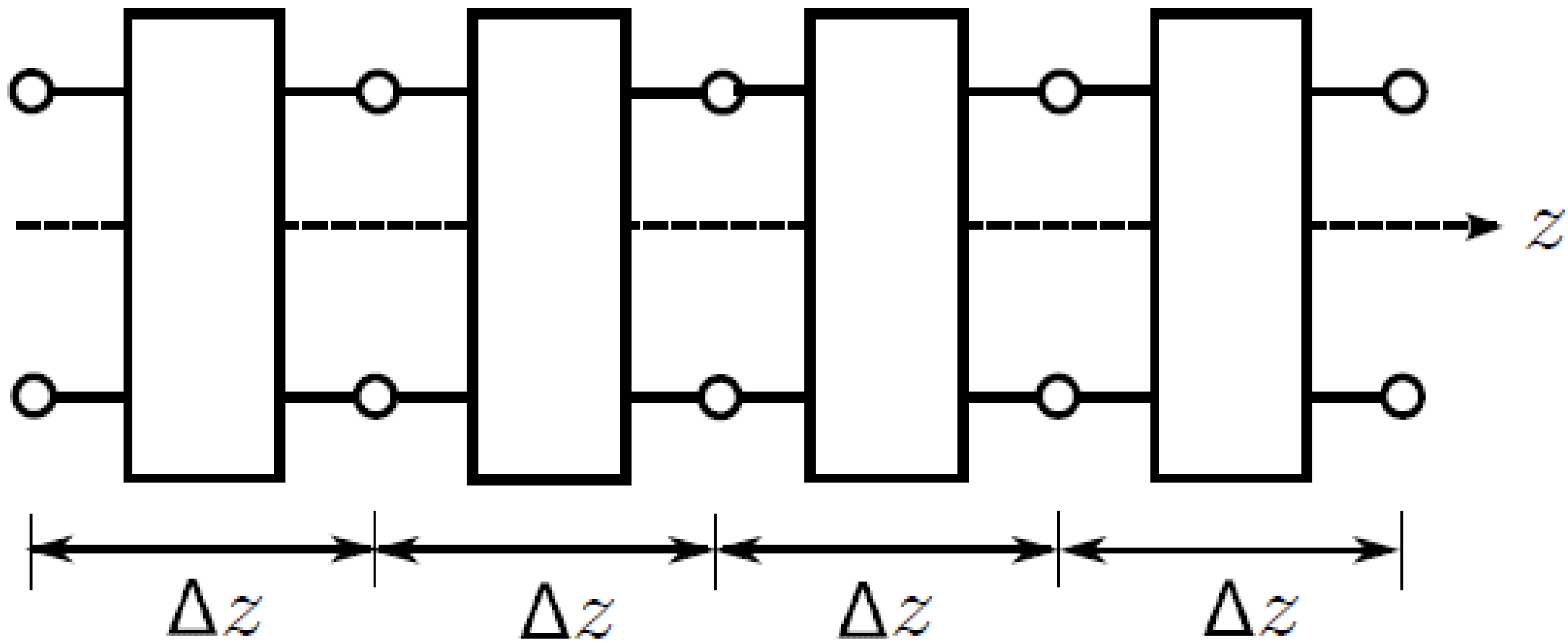


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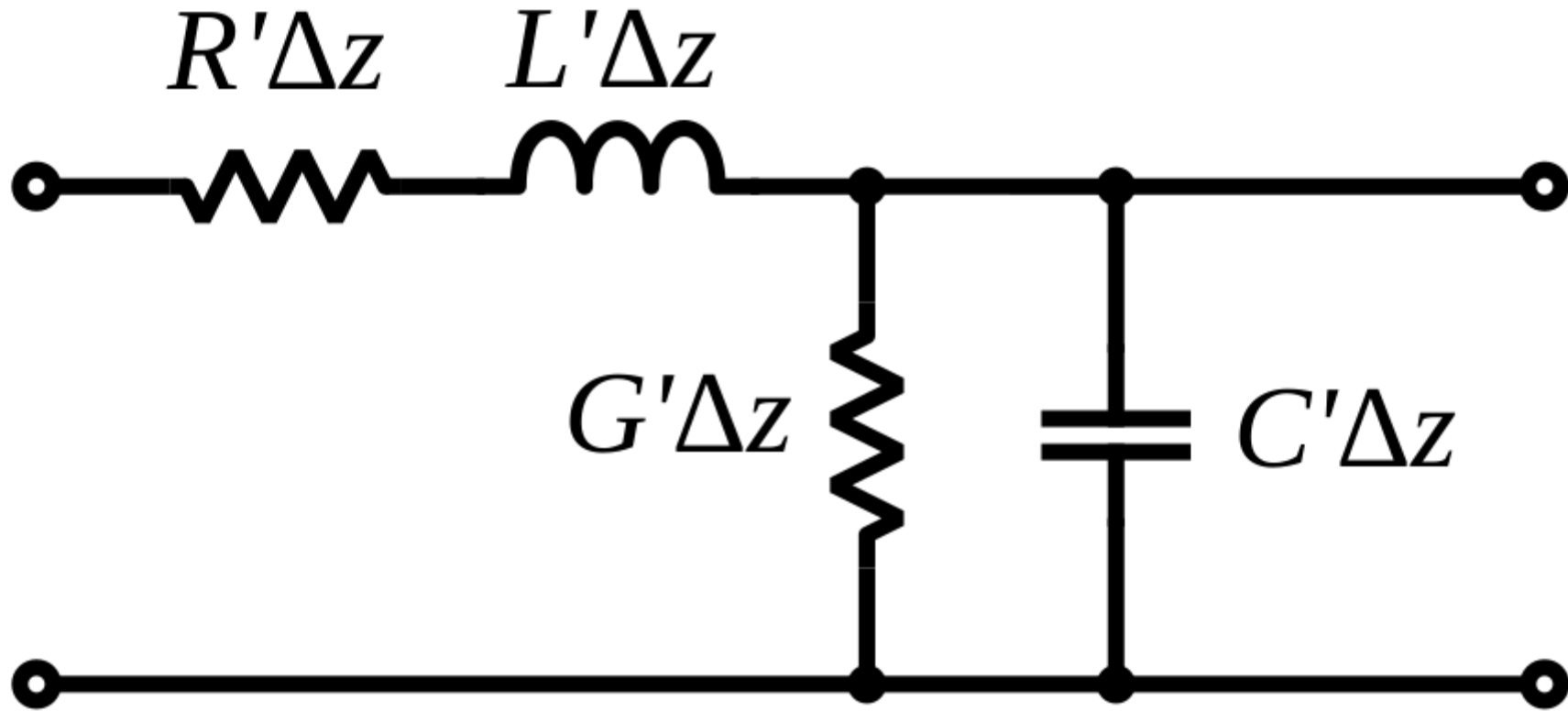


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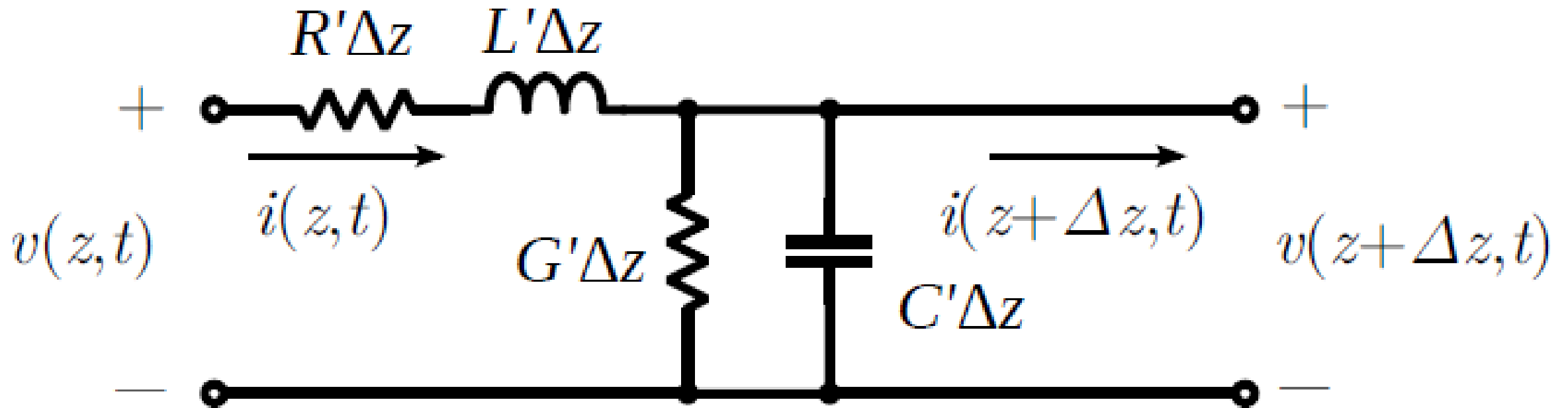


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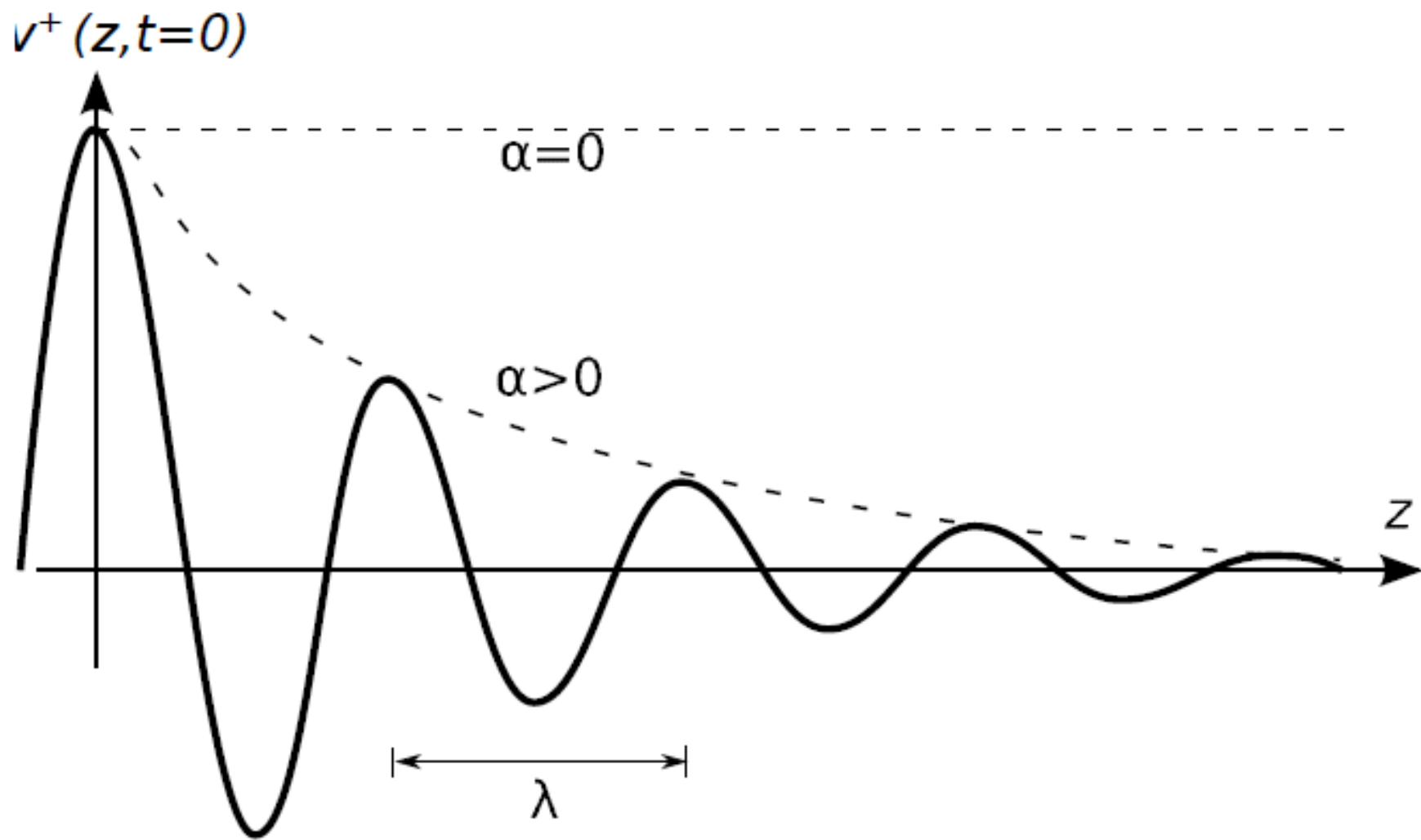


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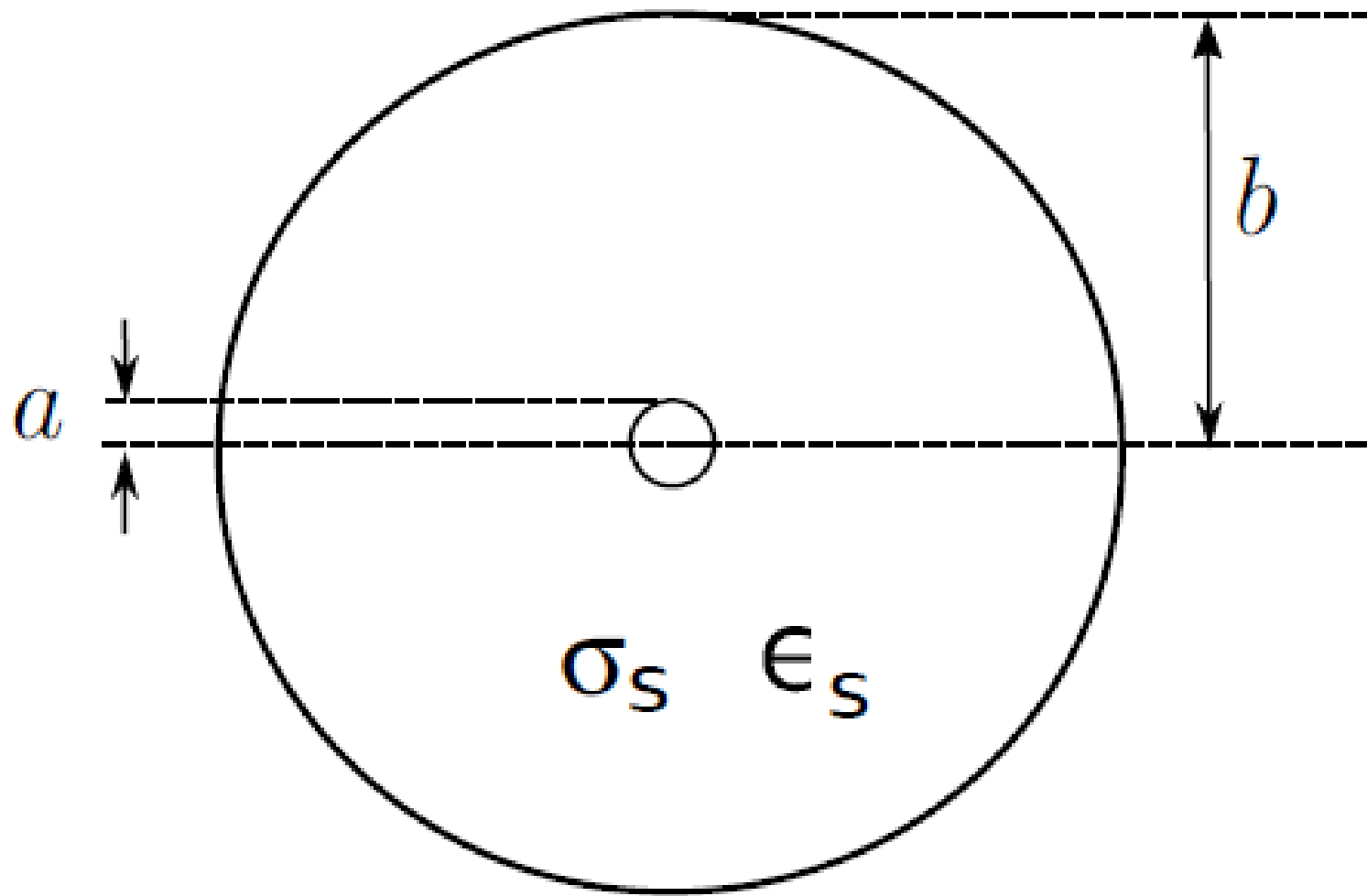


Fig. 3.13

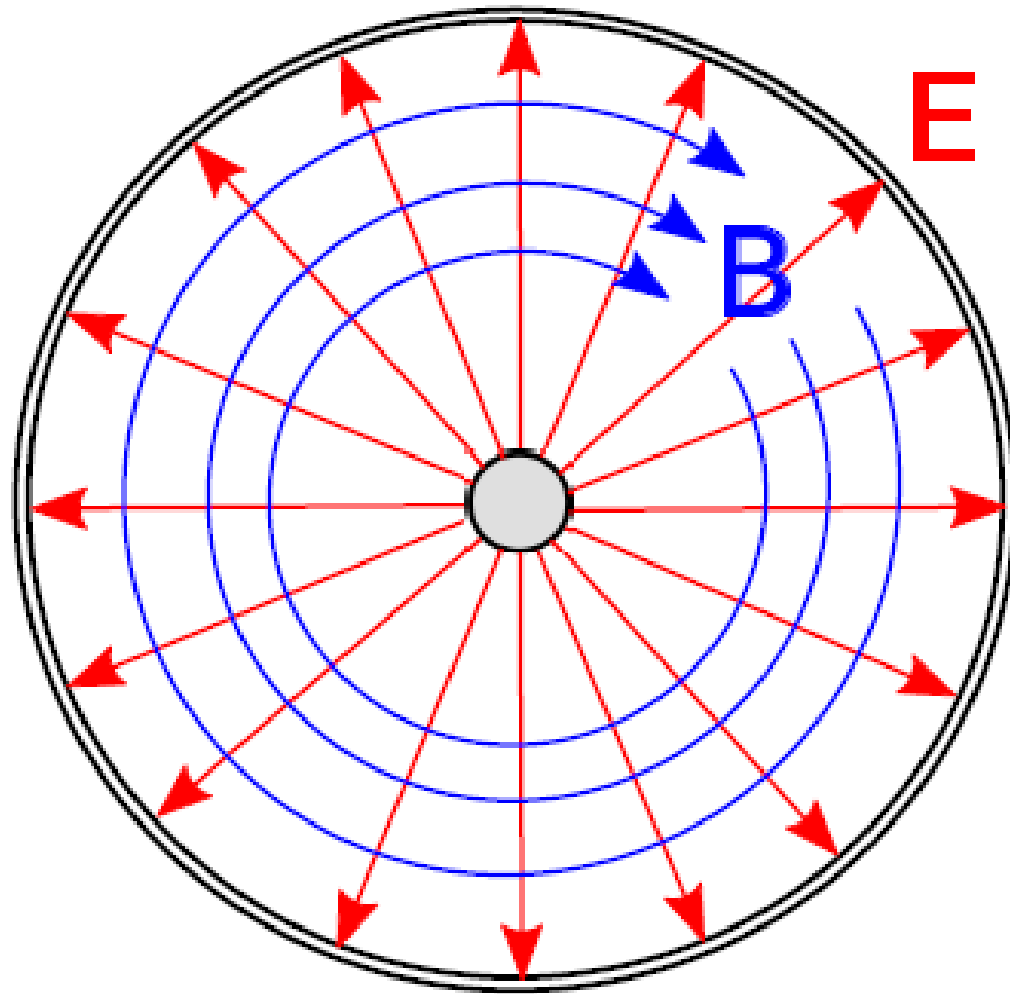


Fig. 3.14

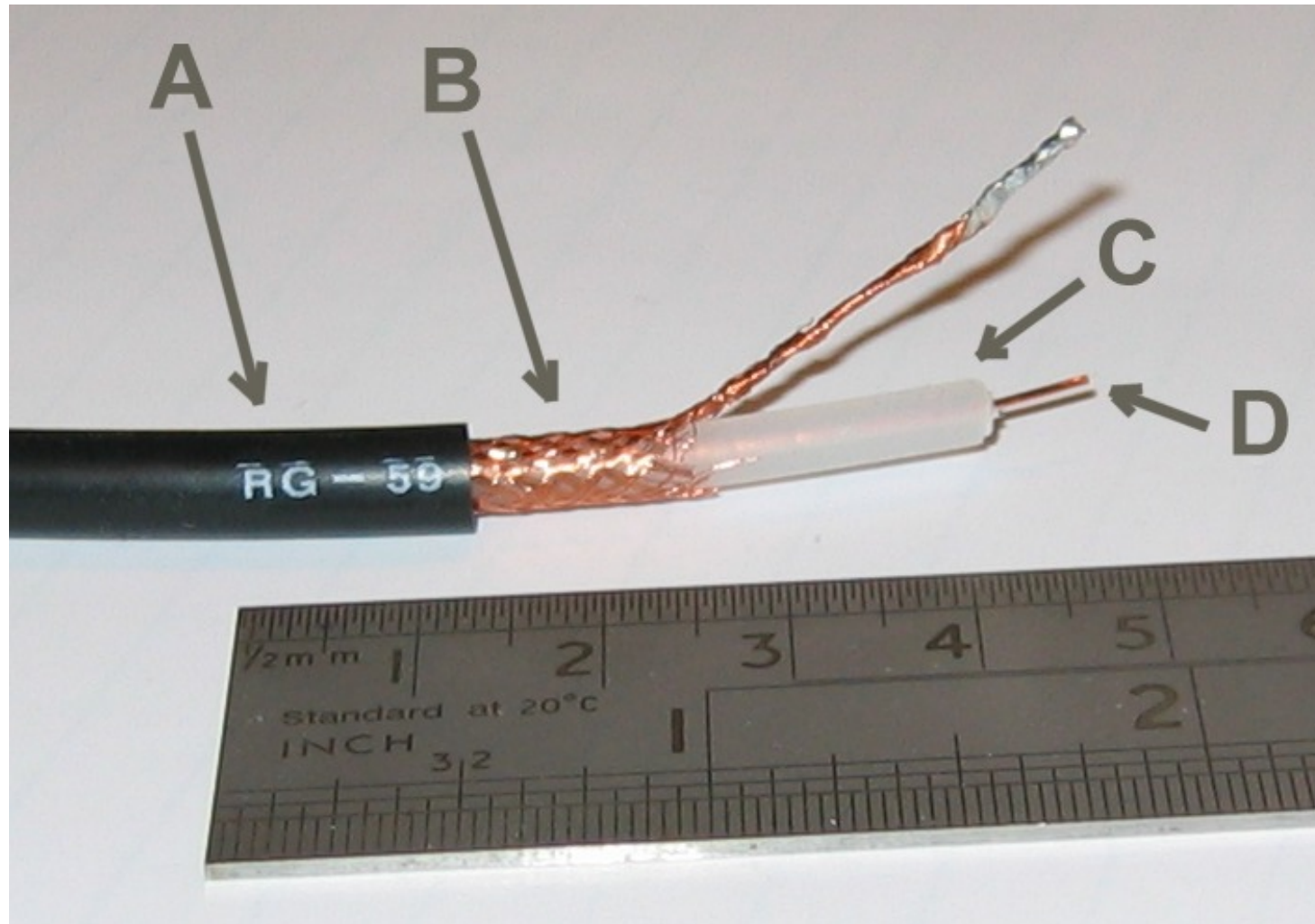


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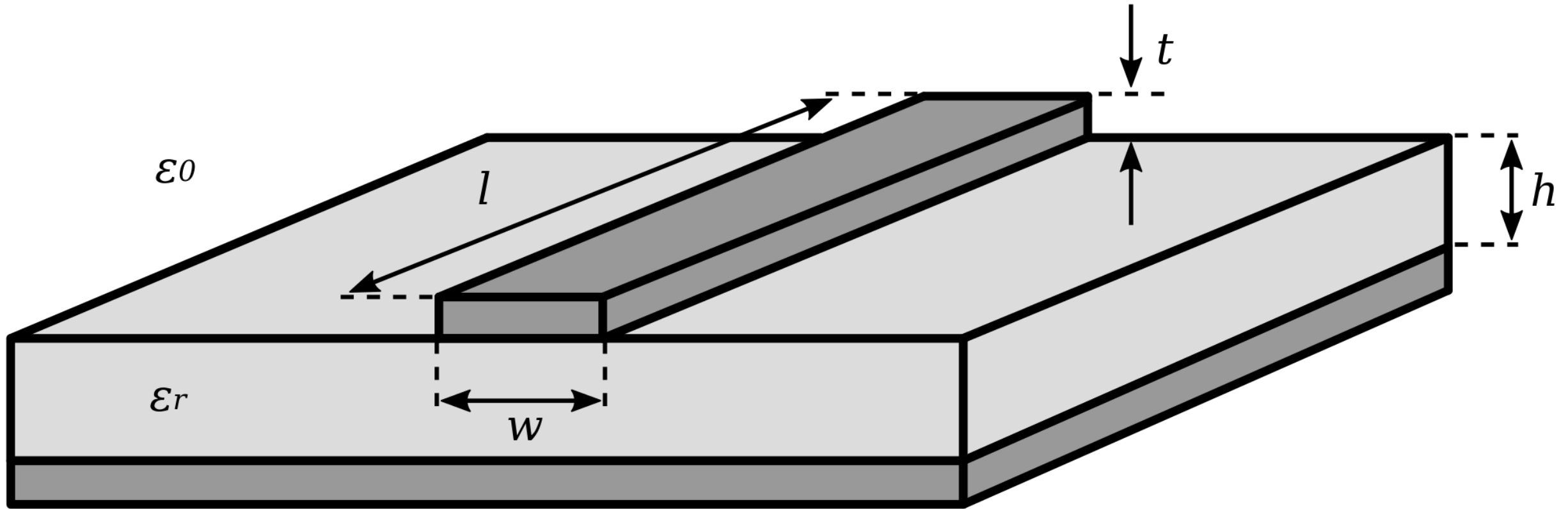


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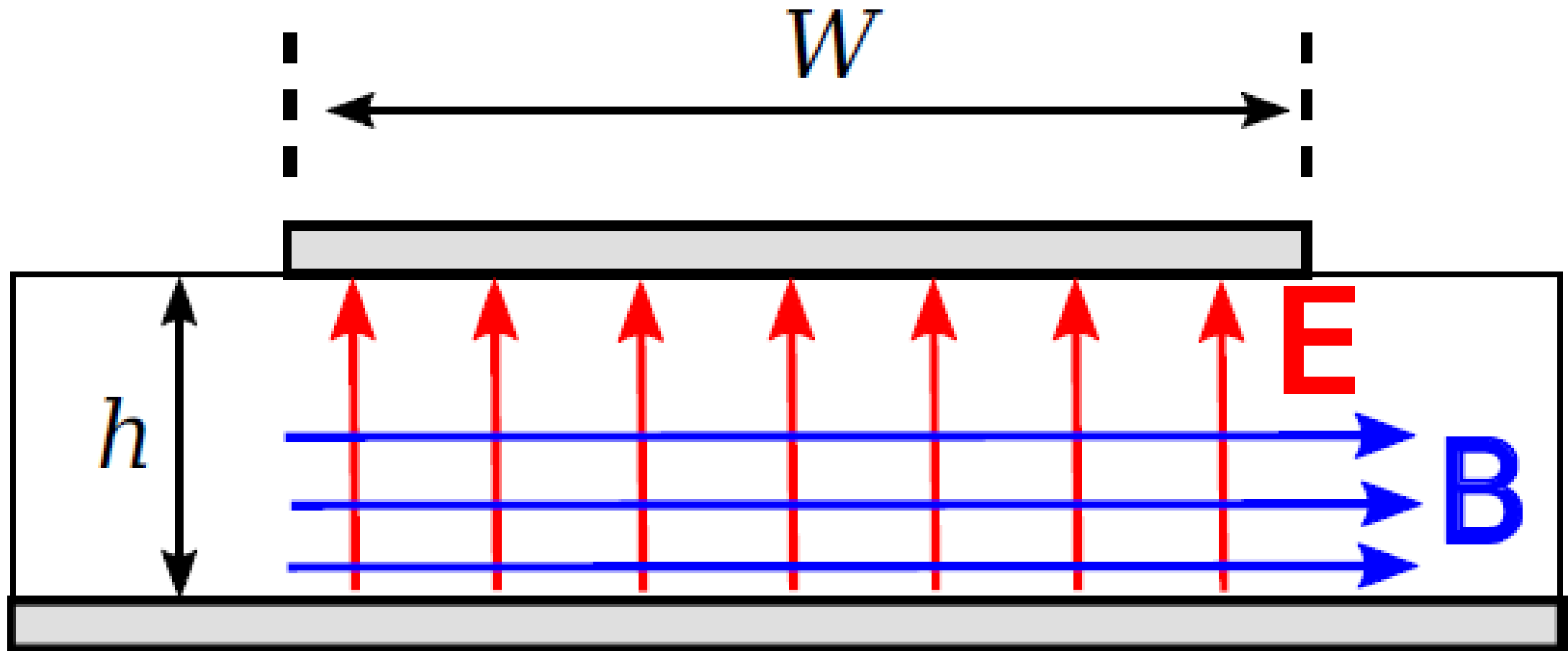


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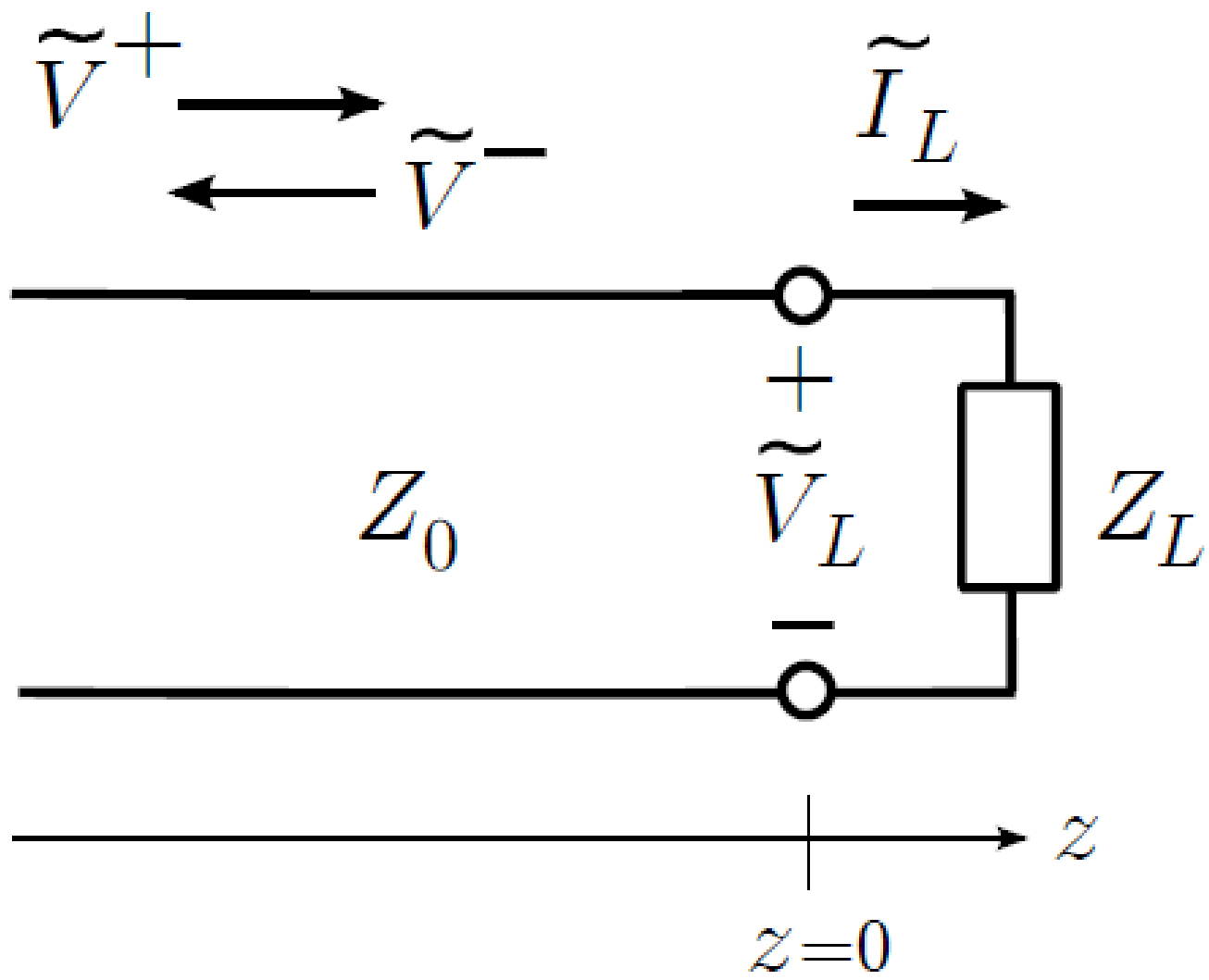
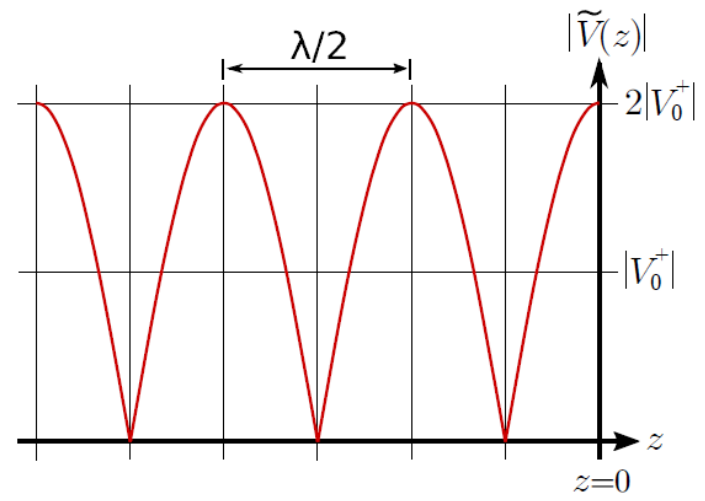
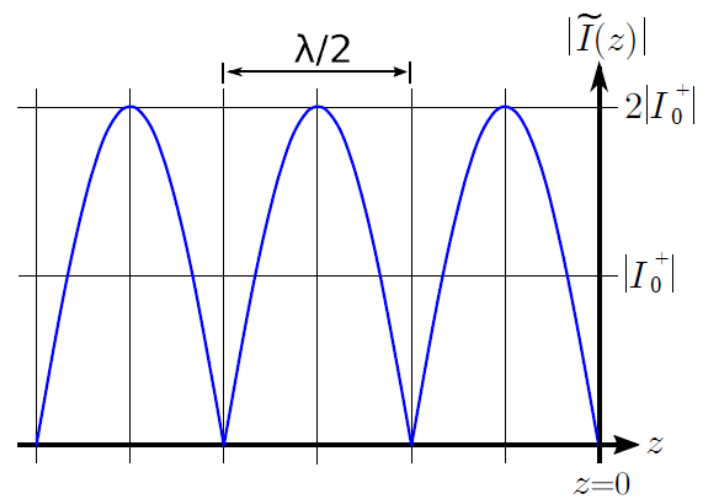


Fig. 3.18



(a) Potential.



(b) Current.

Fig. 3.19

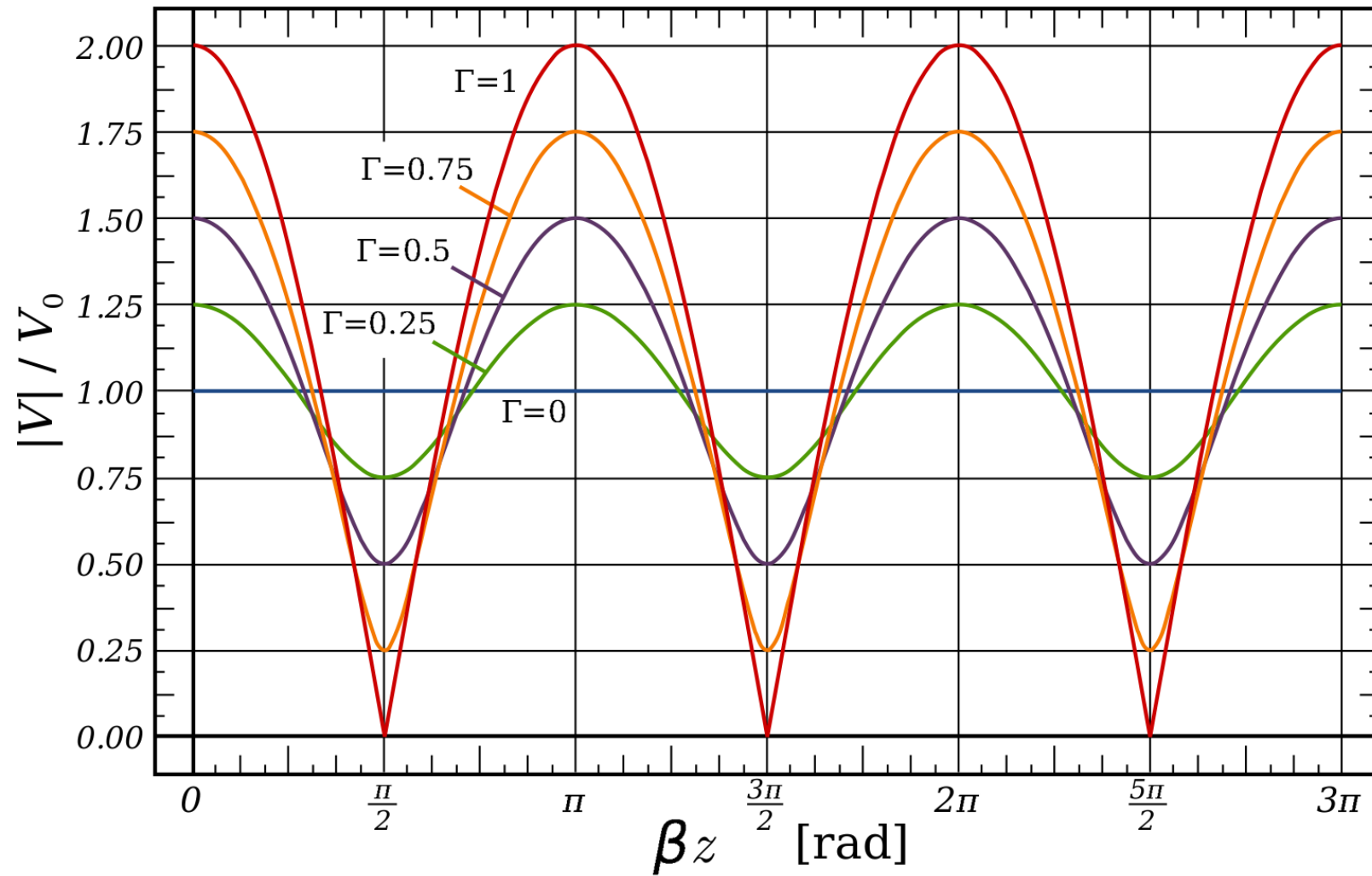


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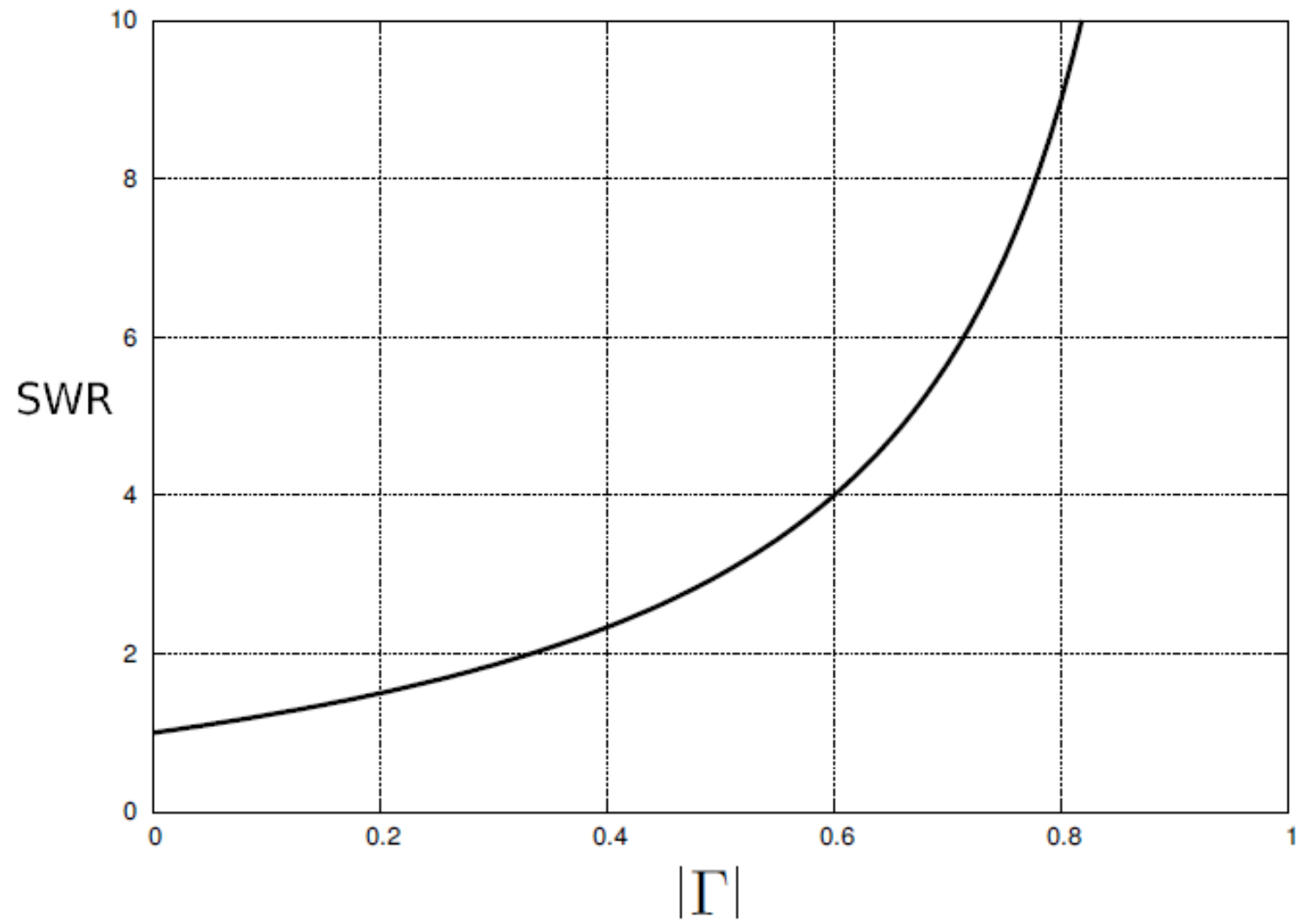


Fig. 3.21

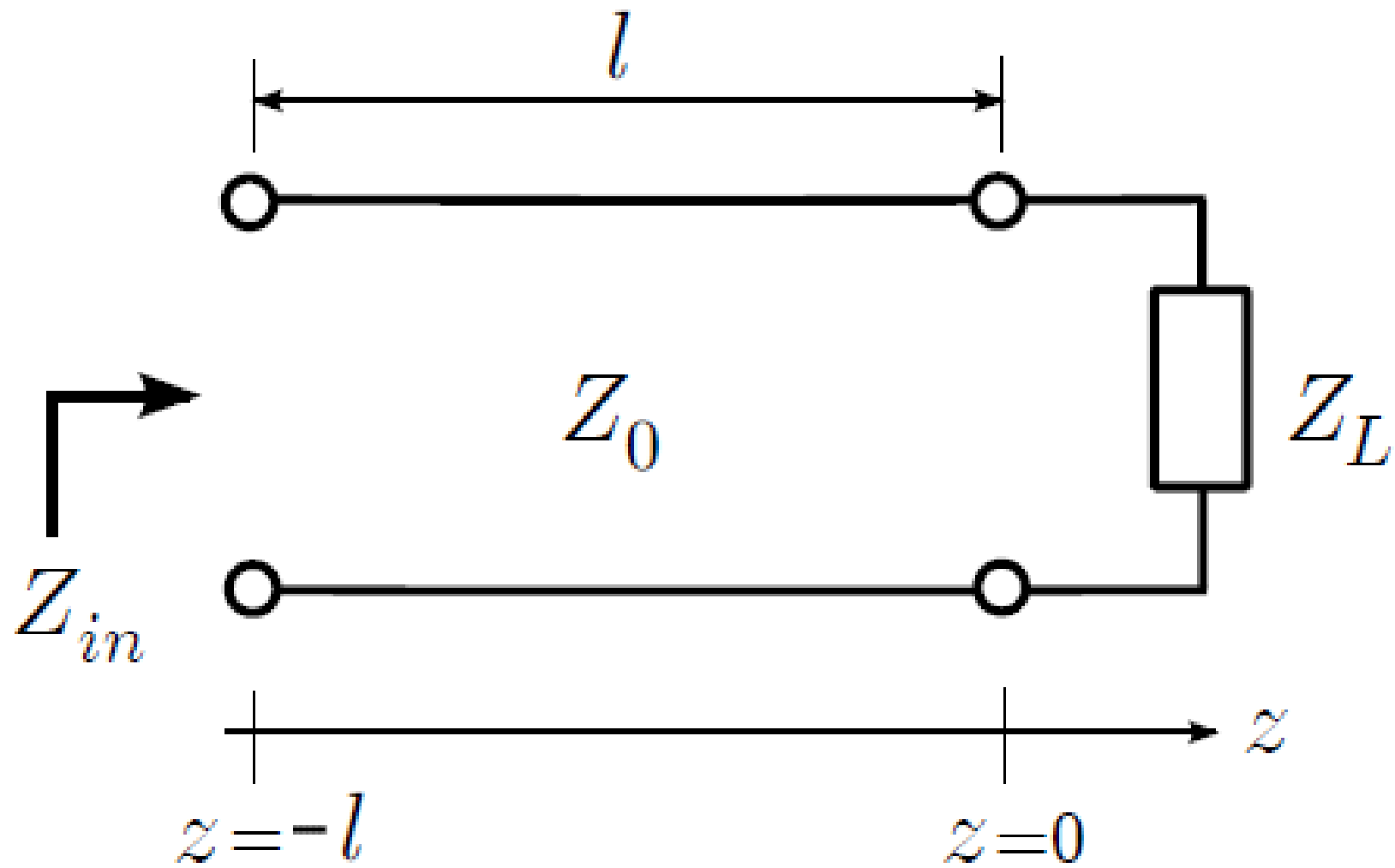
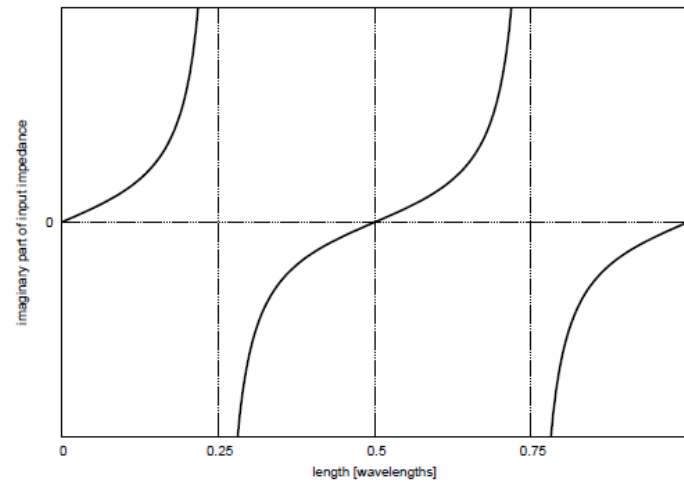
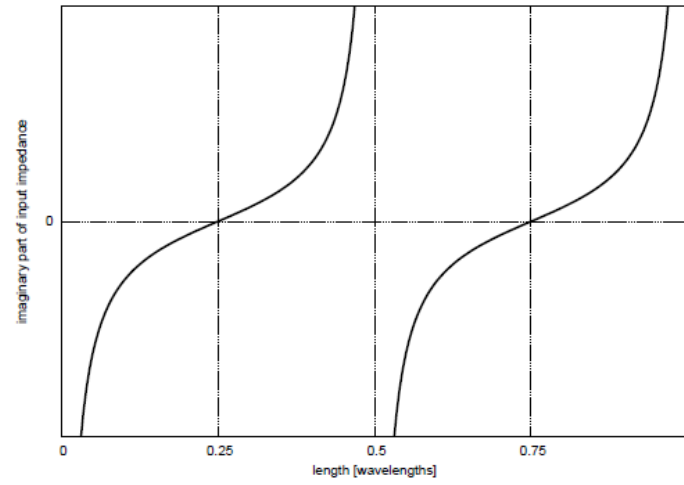


Fig. 3.22



(a) Short-circuit termination ( $Z_L = 0$ ).

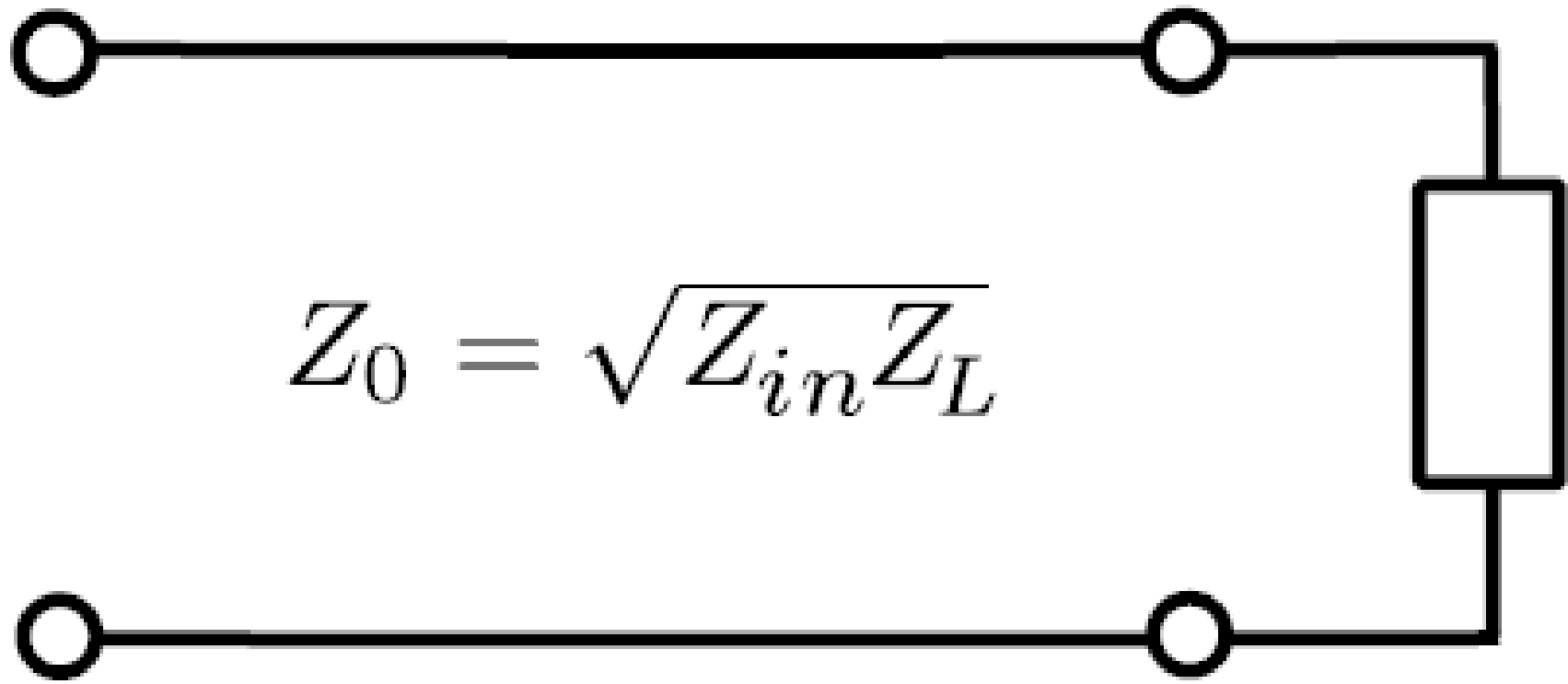


(b) Open-circuit termination ( $Z_L \rightarrow \infty$ ).

**Fig. 3.23**

$$l = \lambda / 4$$

$Z_{in}$



$Z_L$

Fig. 3.24

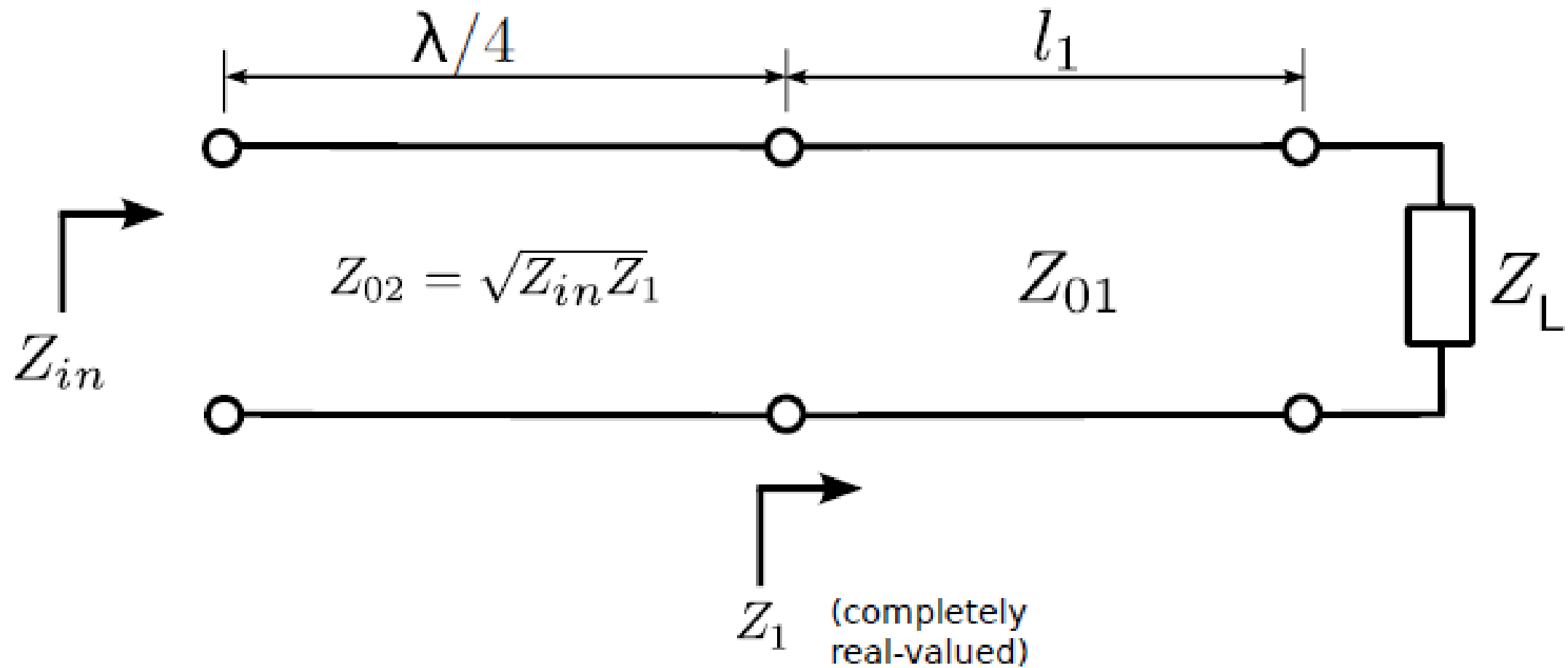


Fig. 3.25

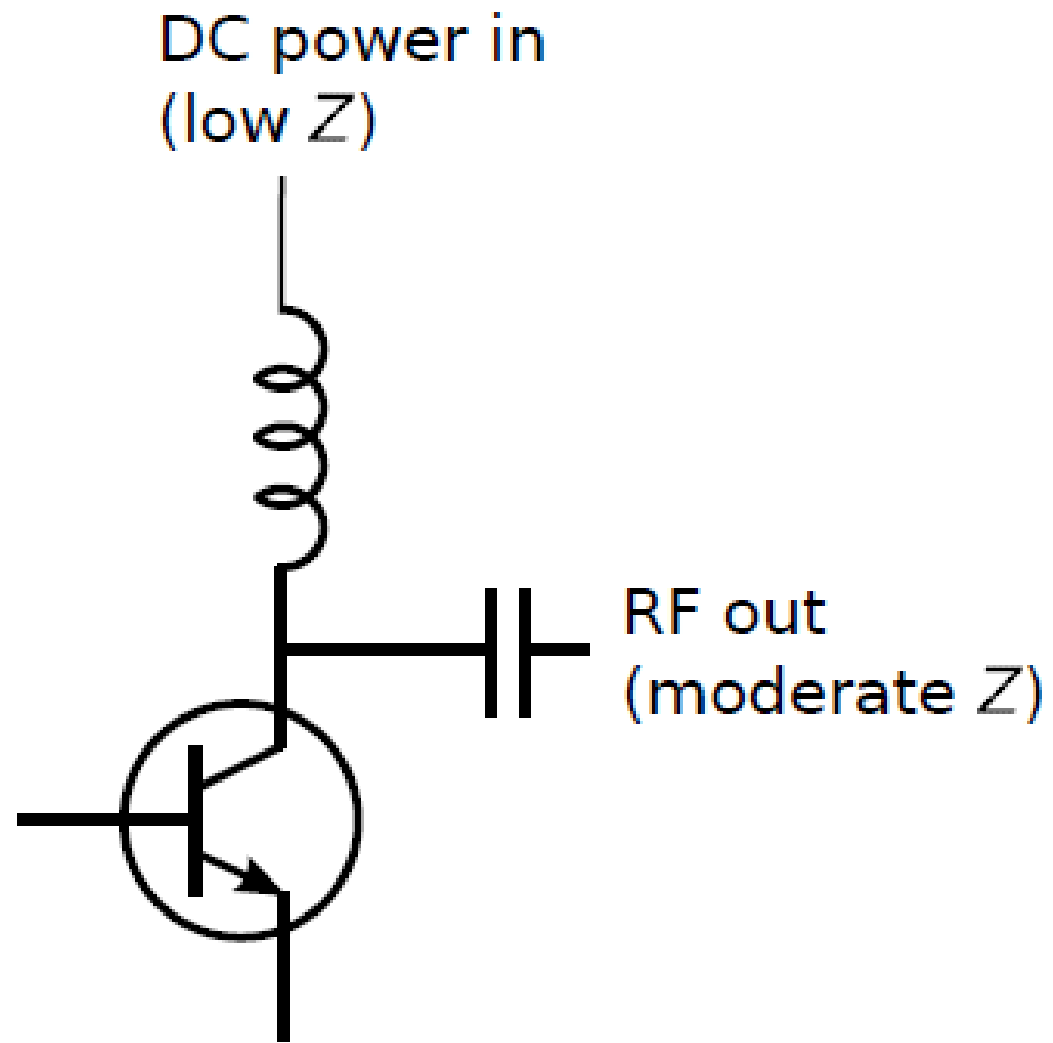


Fig. 3.26

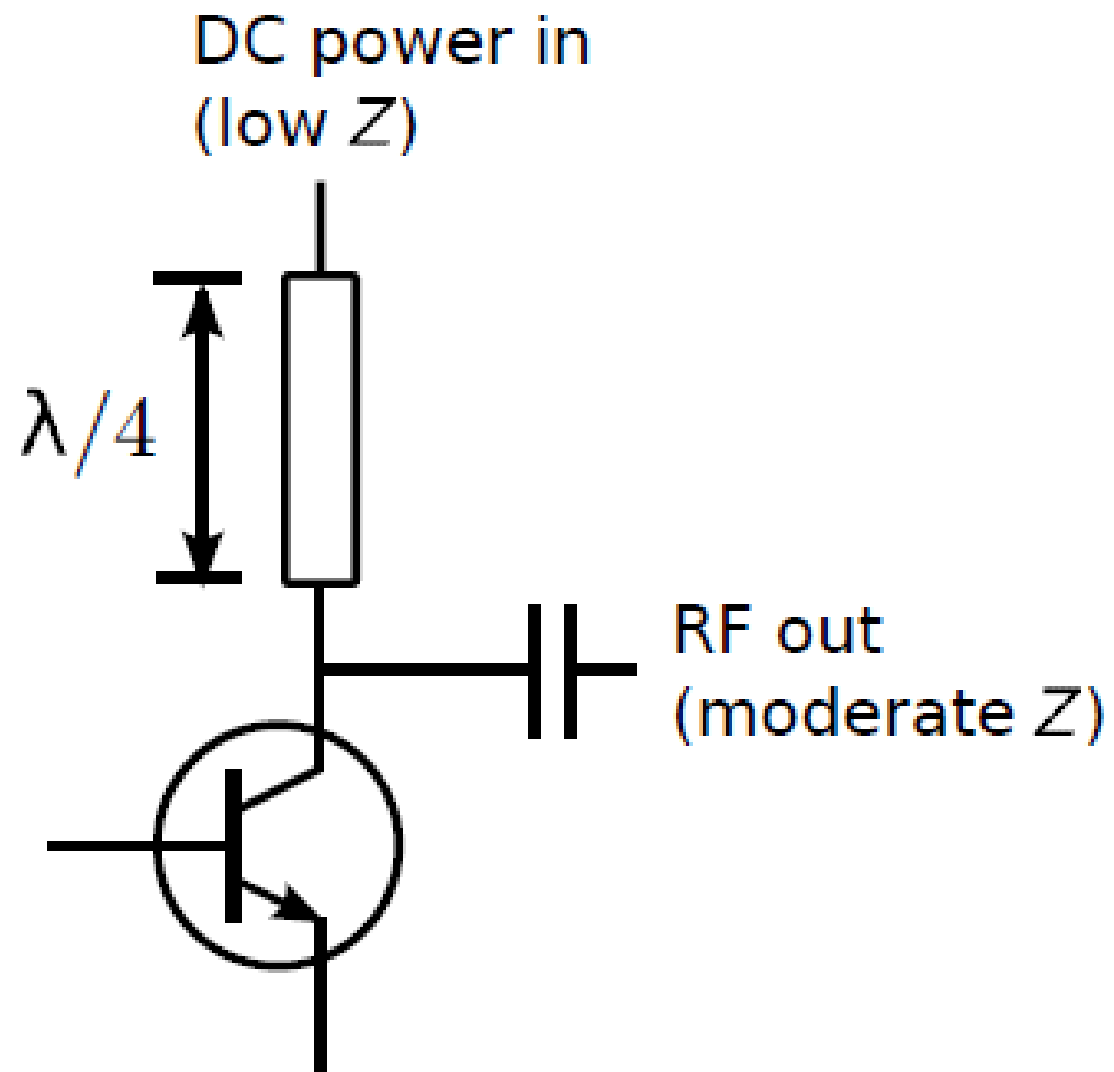


Fig. 3.27

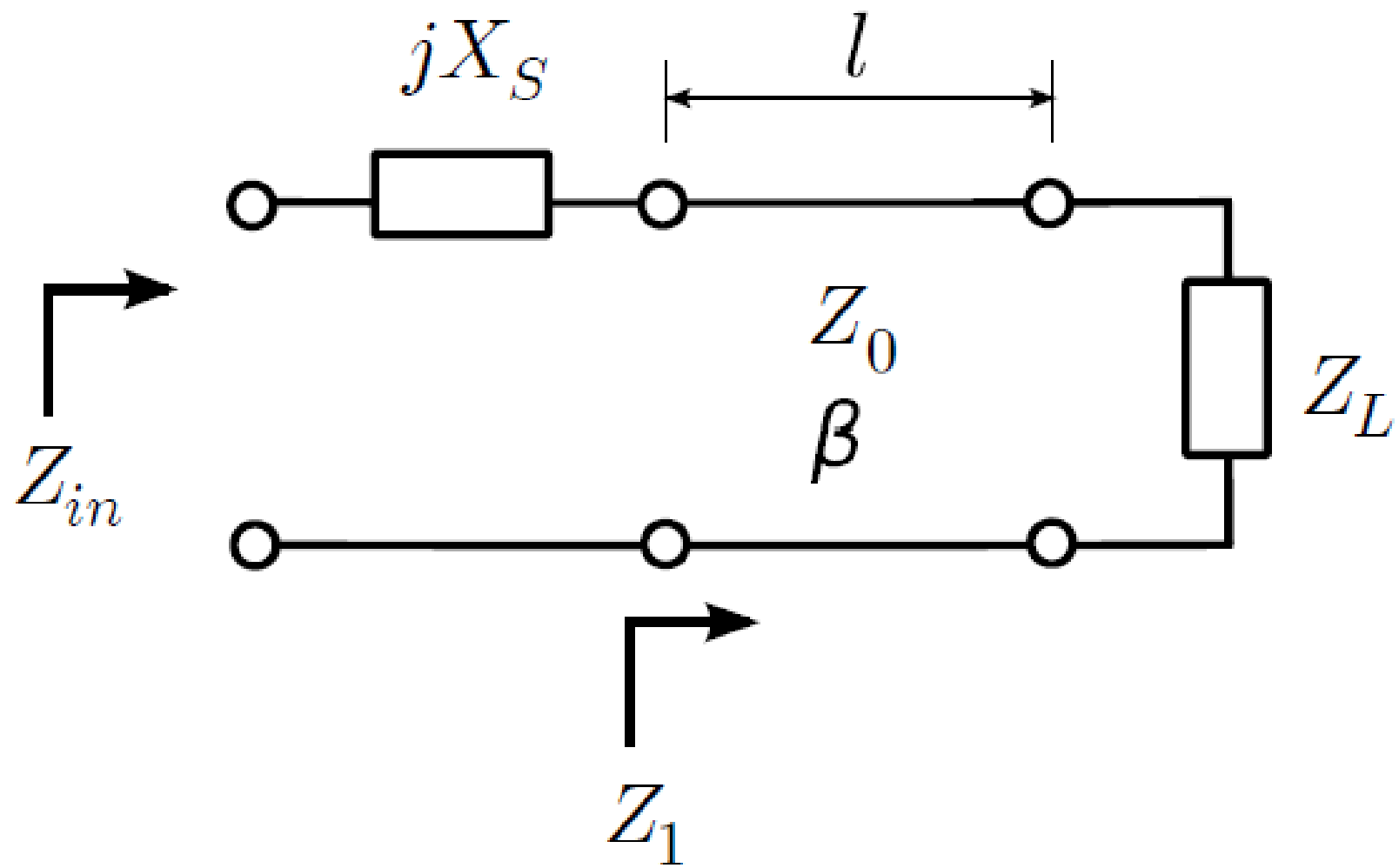


Fig. 3.28

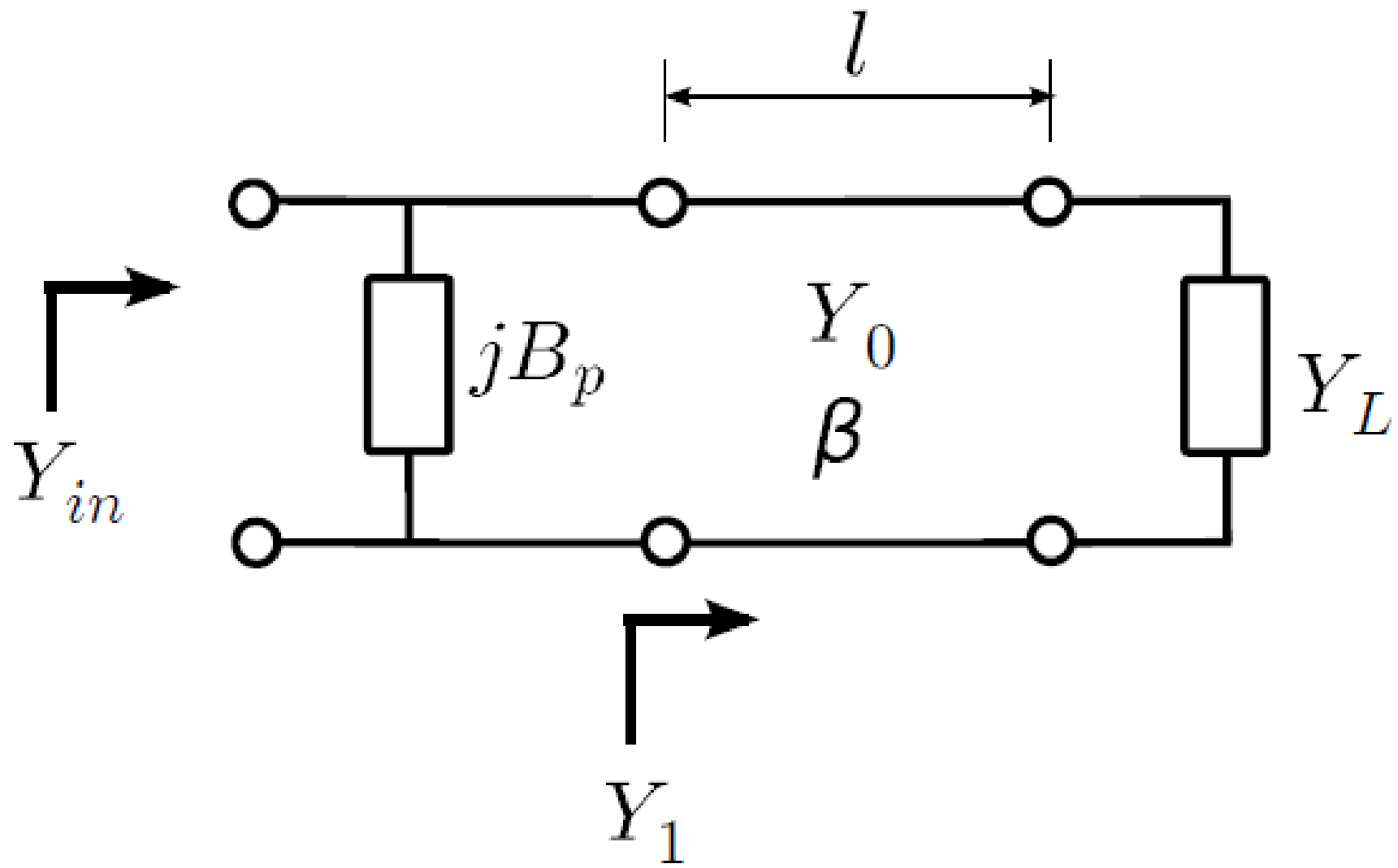


Fig. 3.29

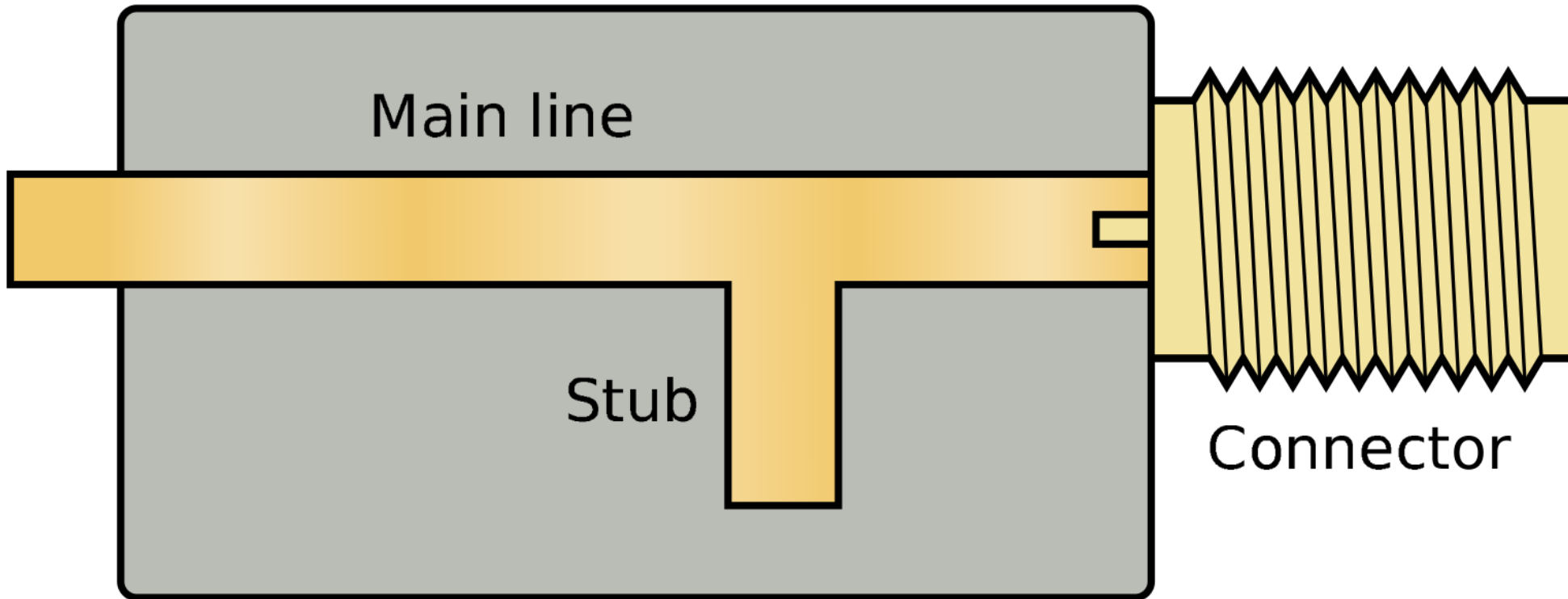


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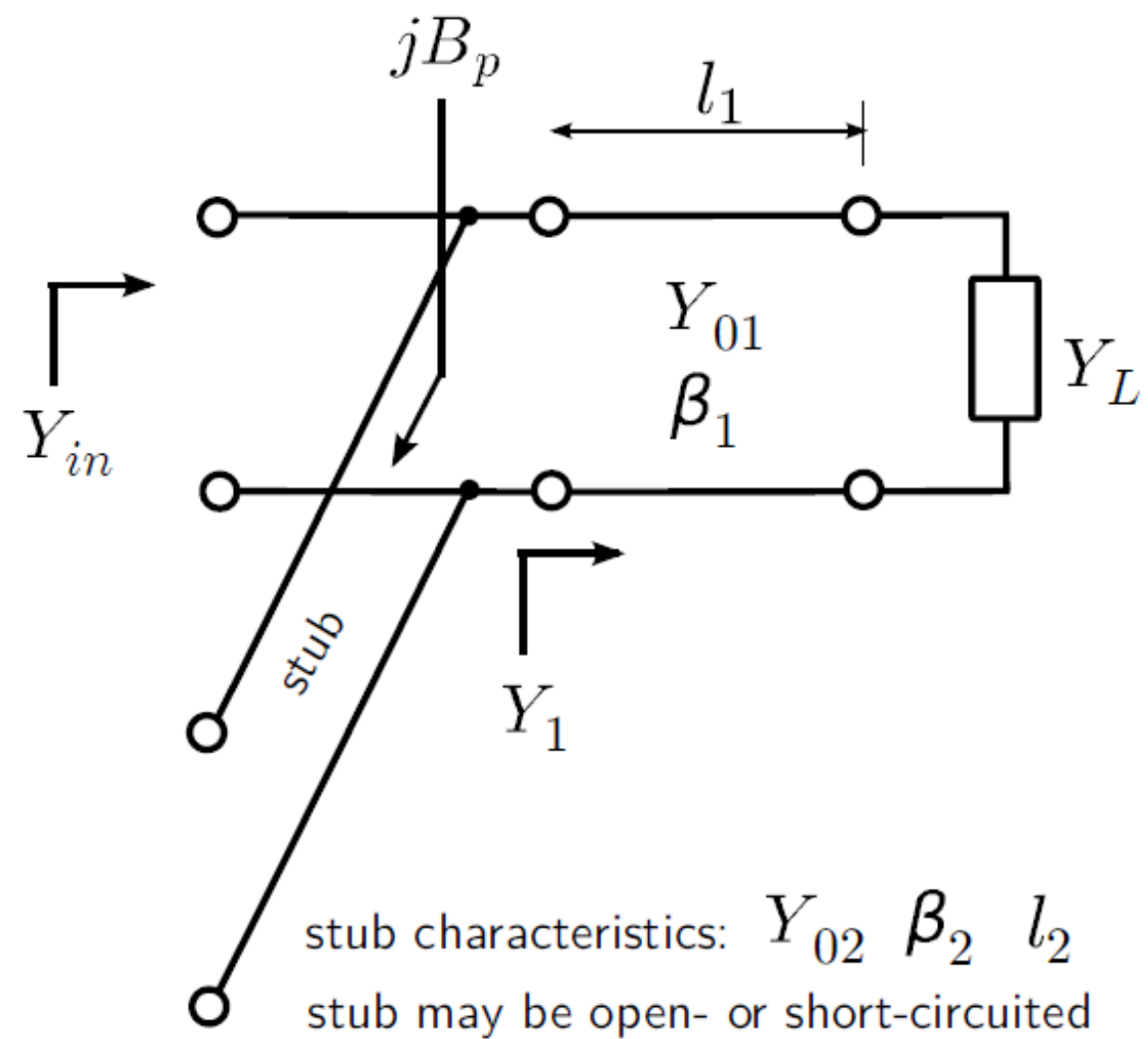


Fig. 3.31

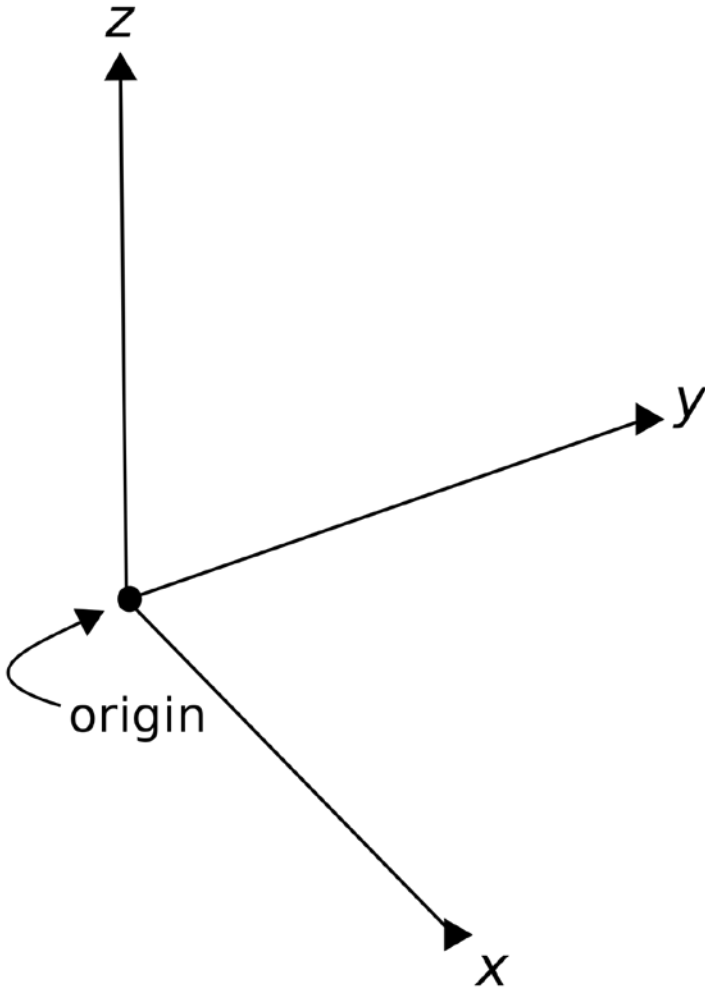


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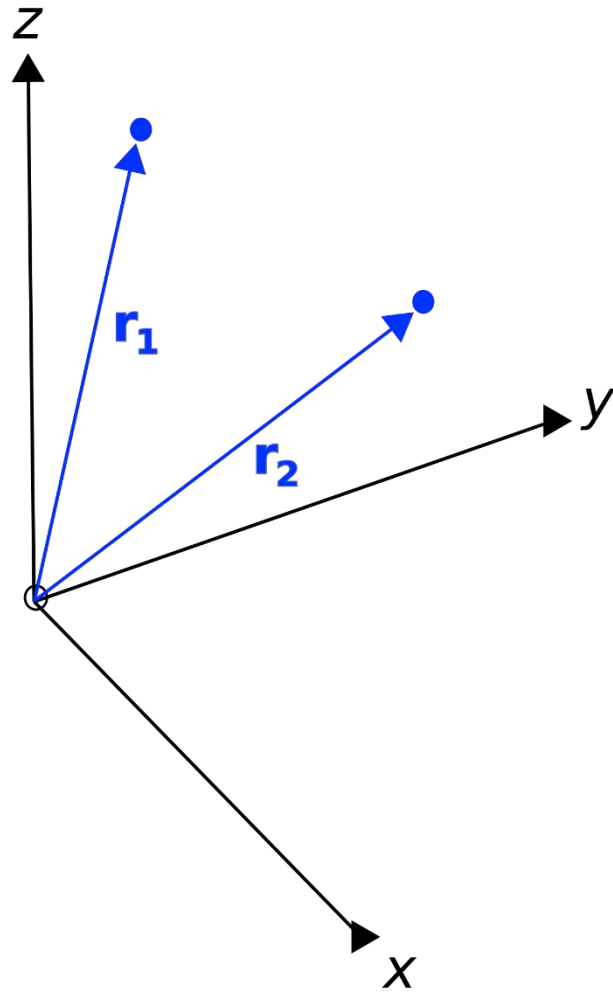


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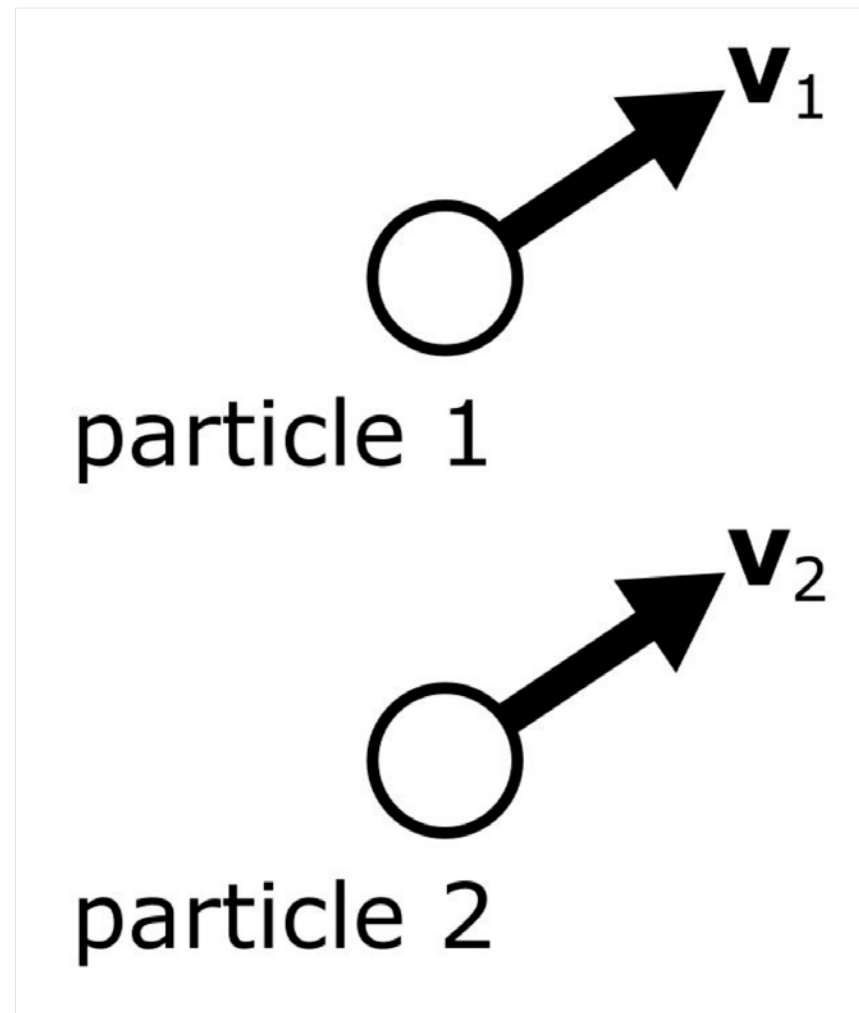


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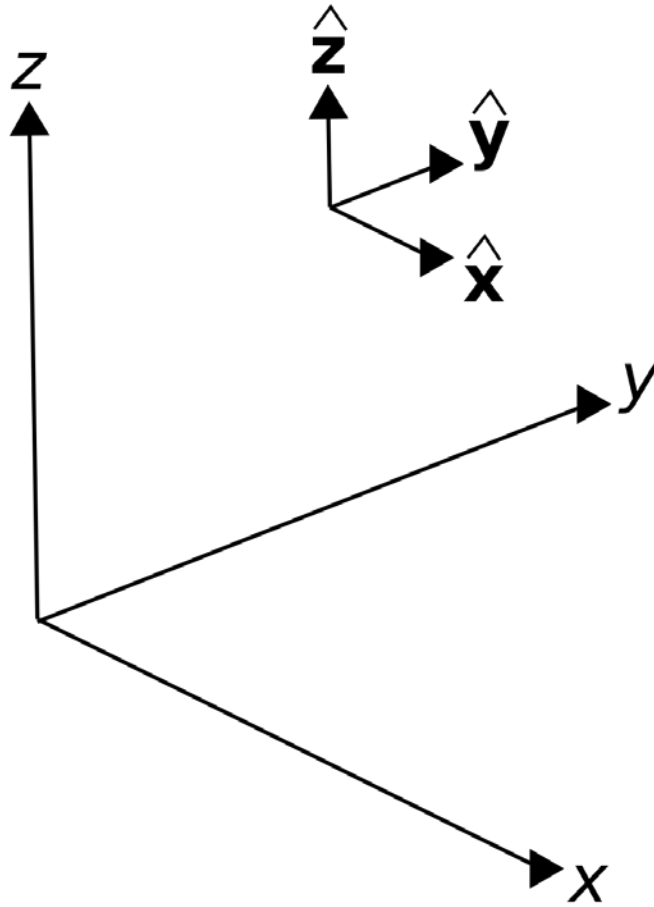


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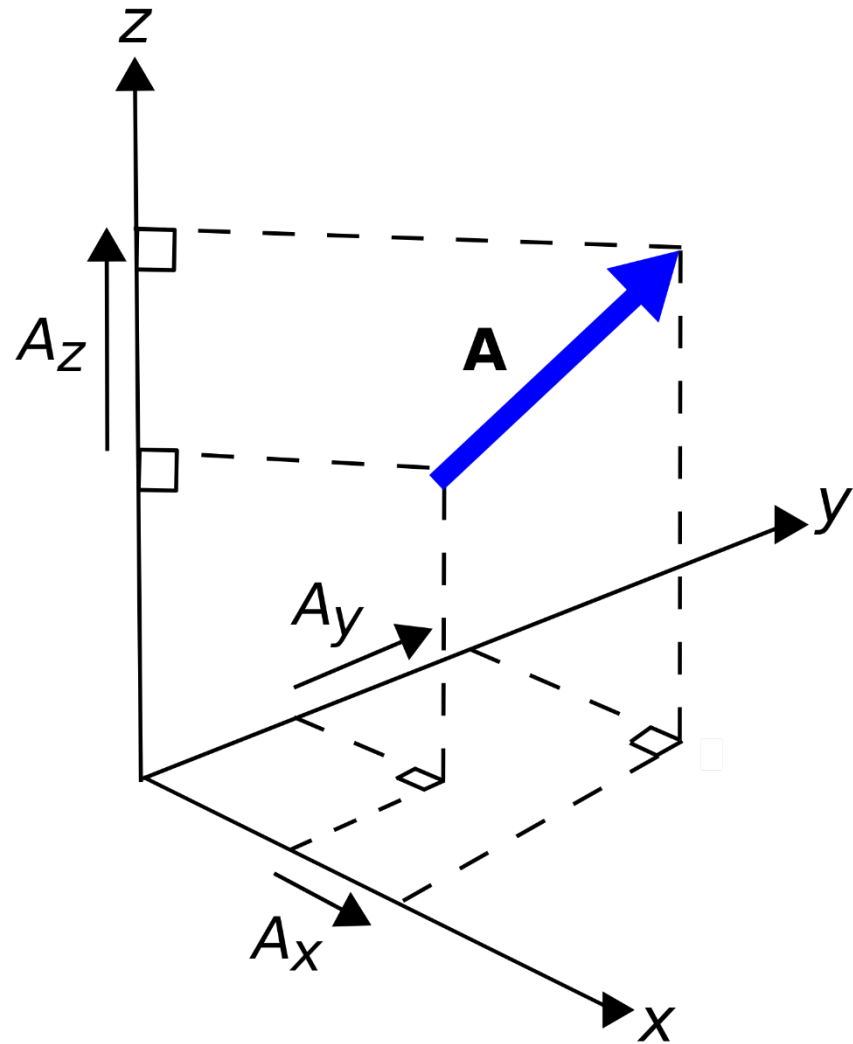


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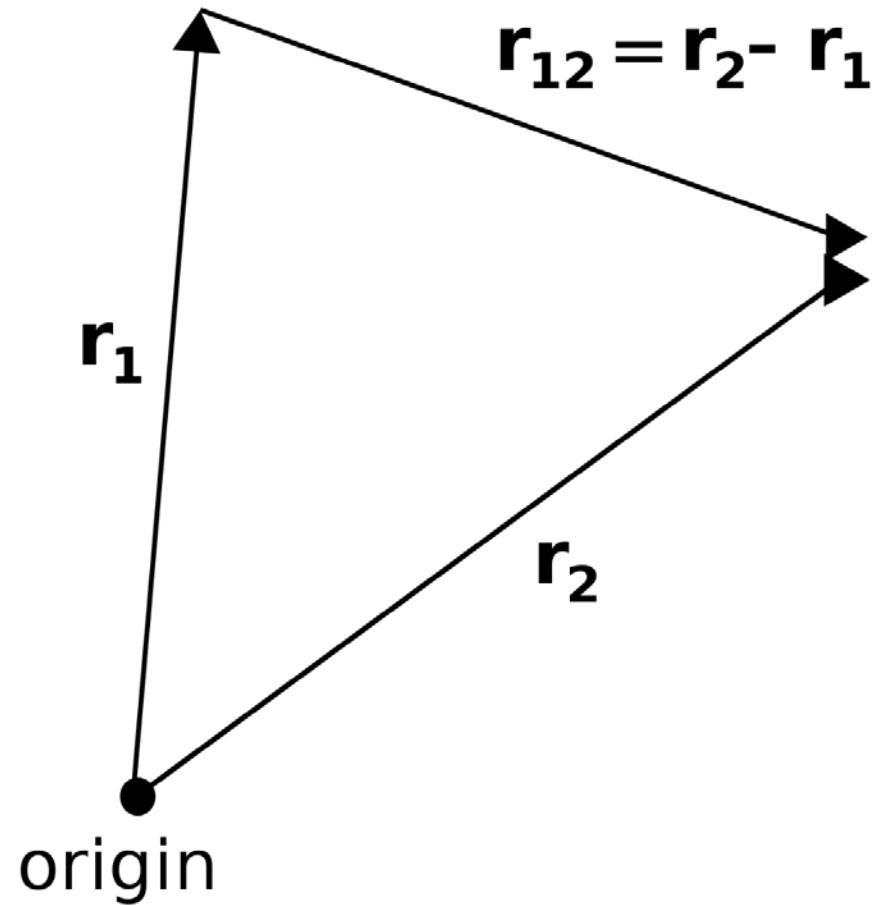


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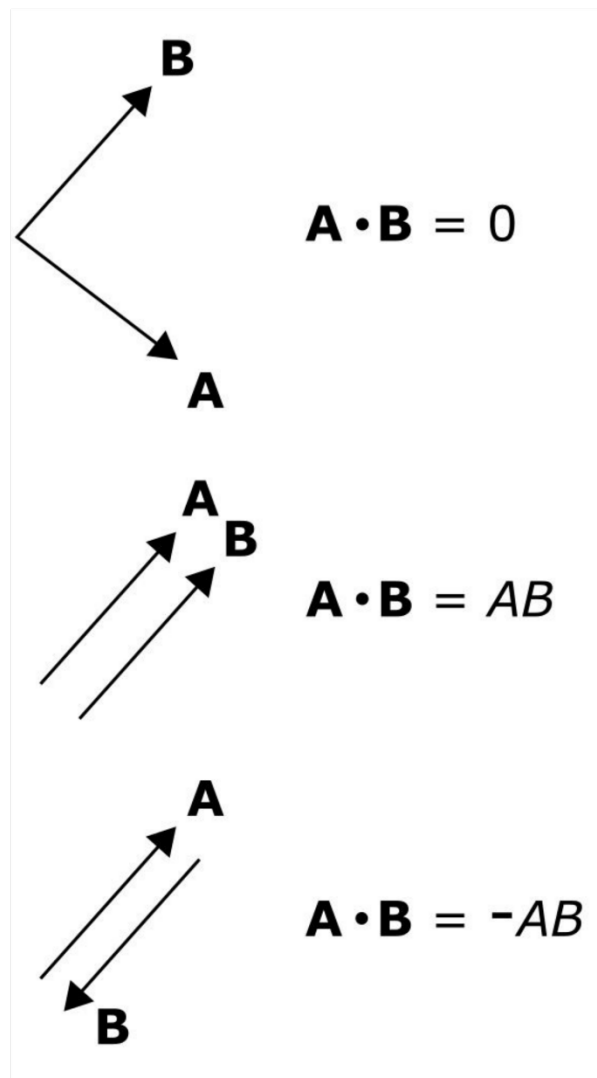


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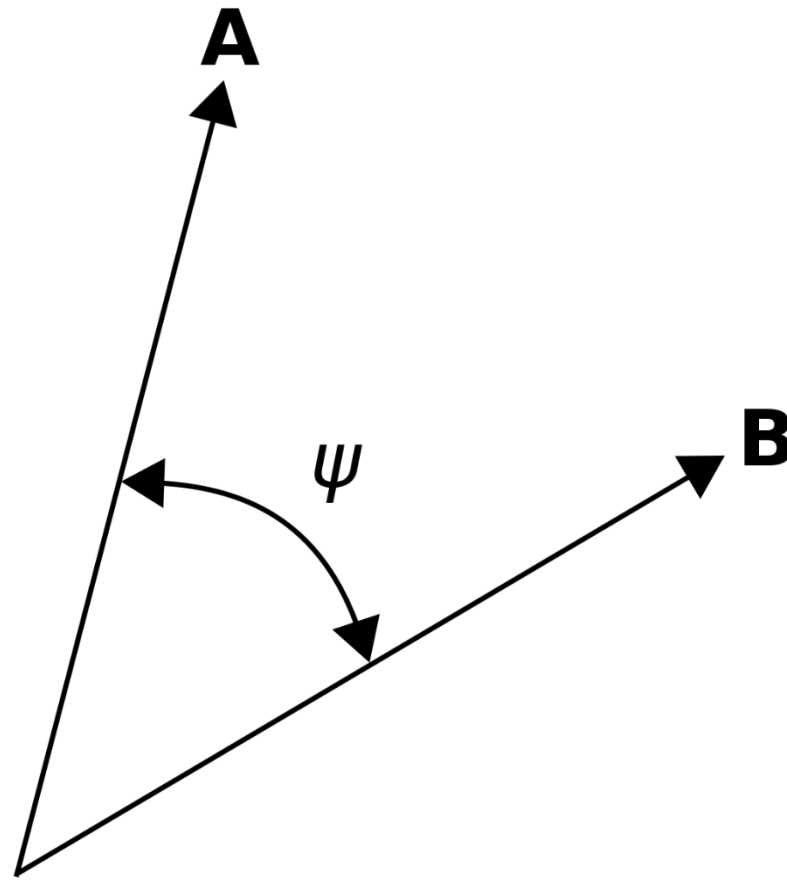


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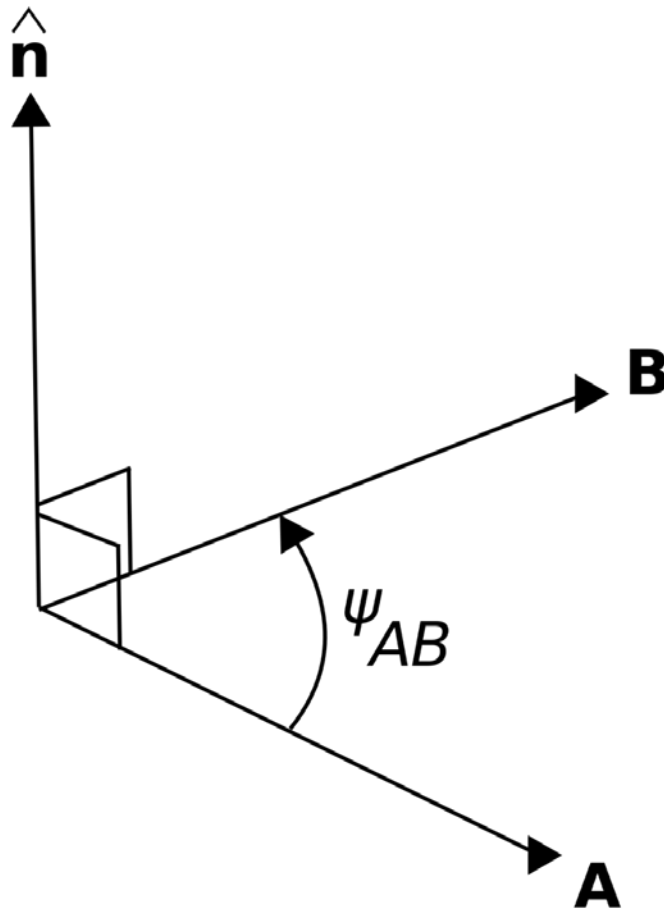


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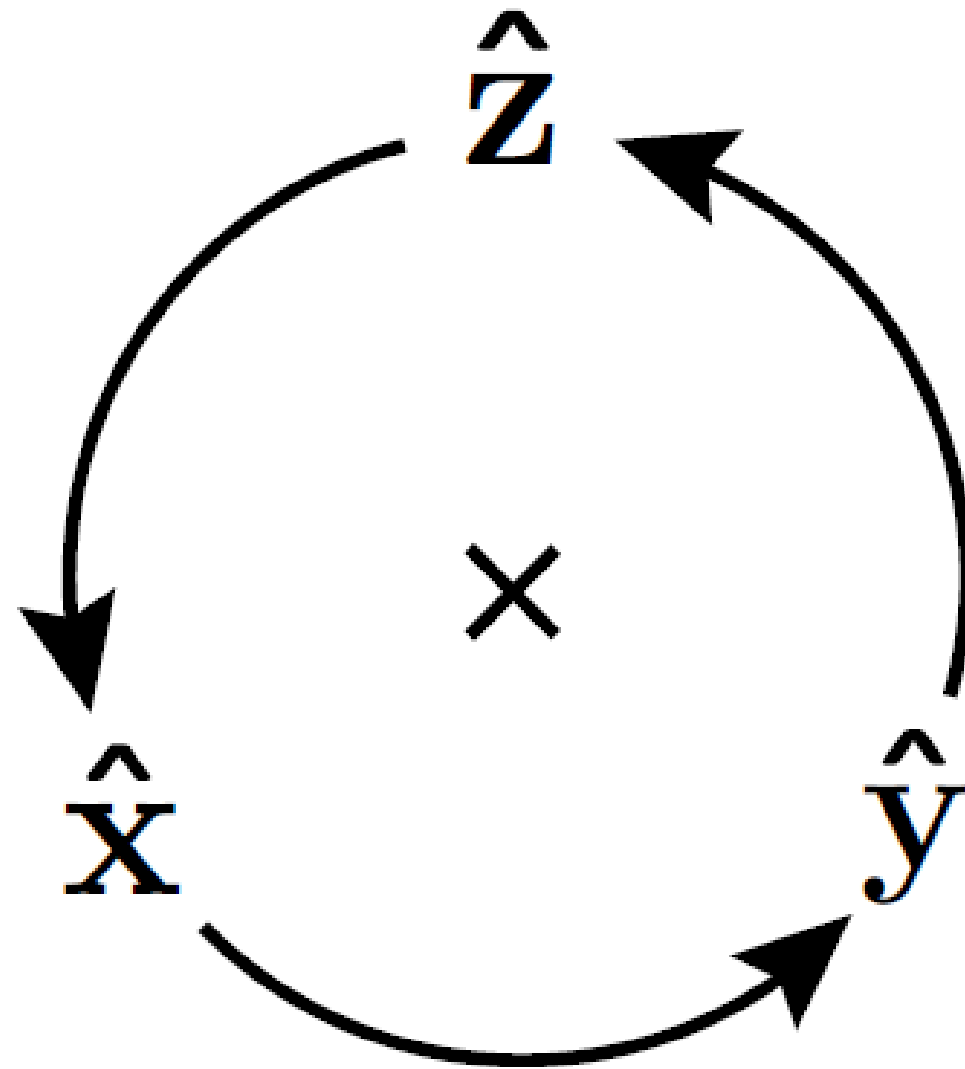


Fig. 4.10

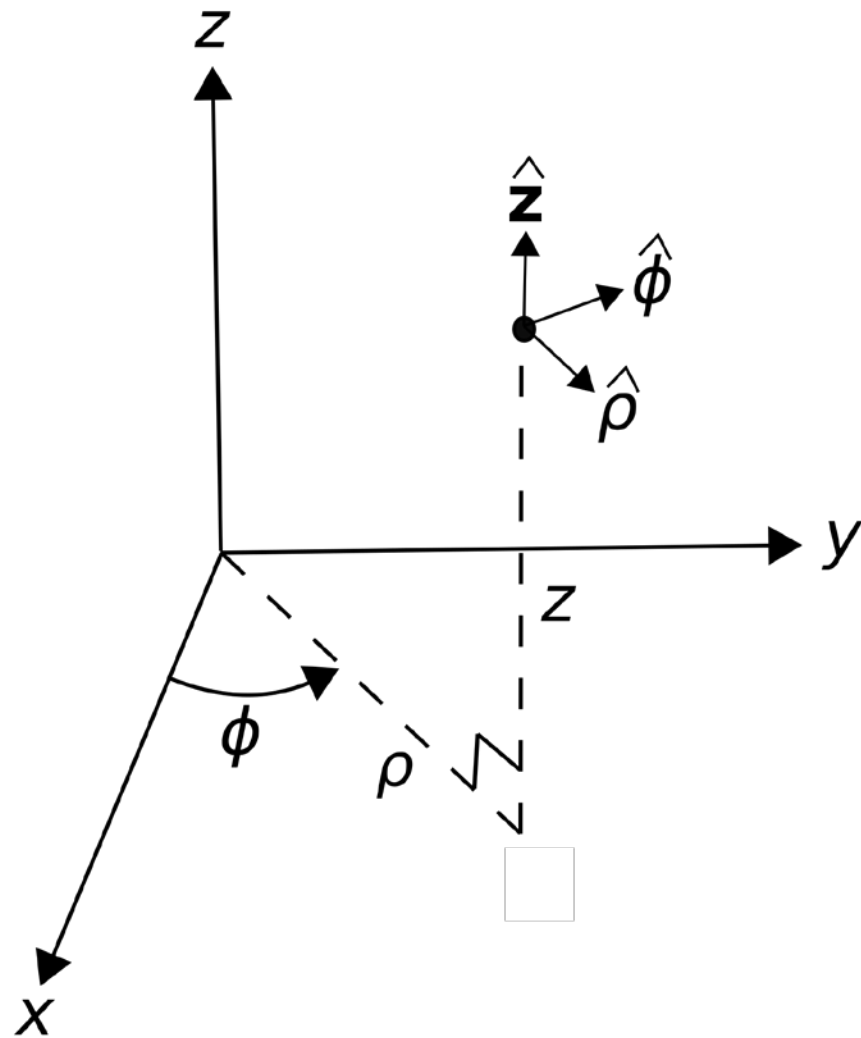


Fig. 4.11: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0096\\_fCylindricalCoordinates.svg](https://commons.wikimedia.org/wiki/File:M0096_fCylindricalCoordinates.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

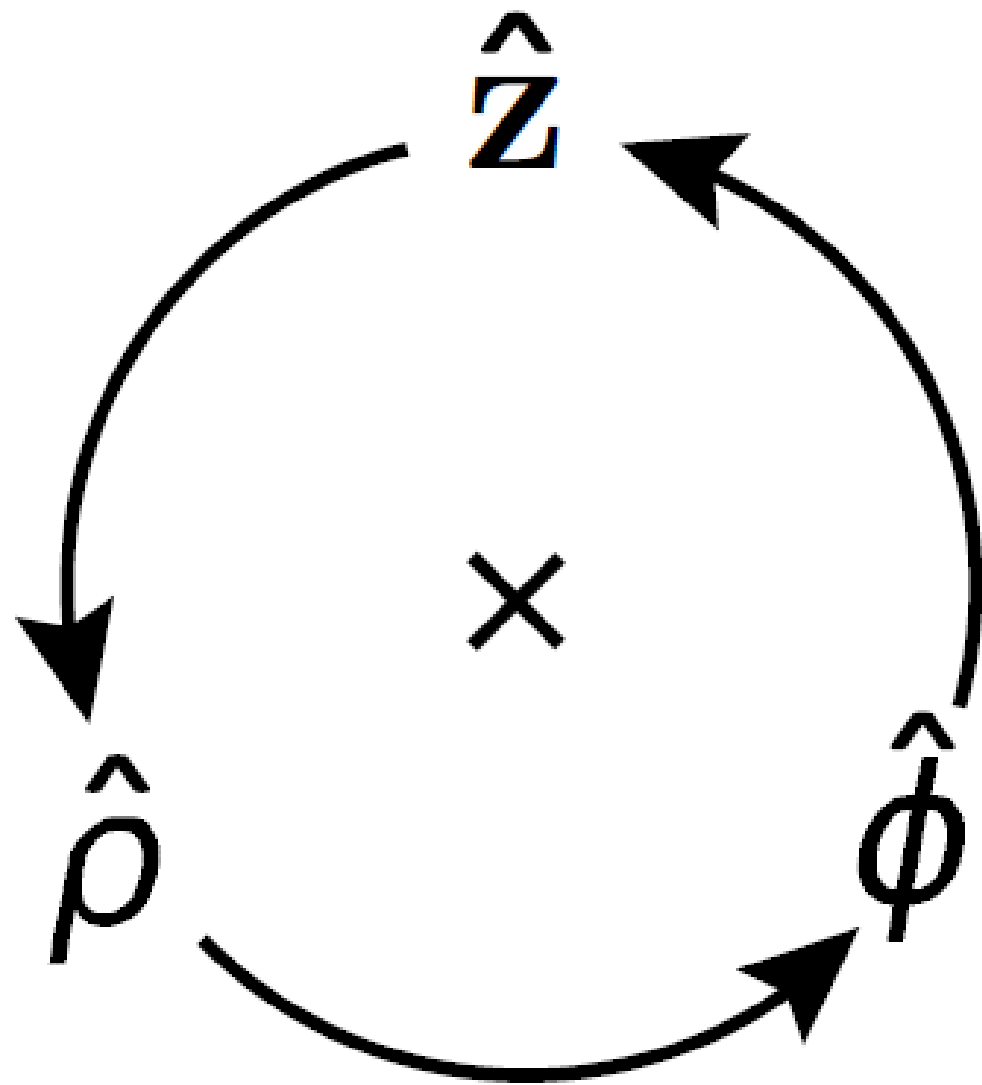


Fig. 4.12

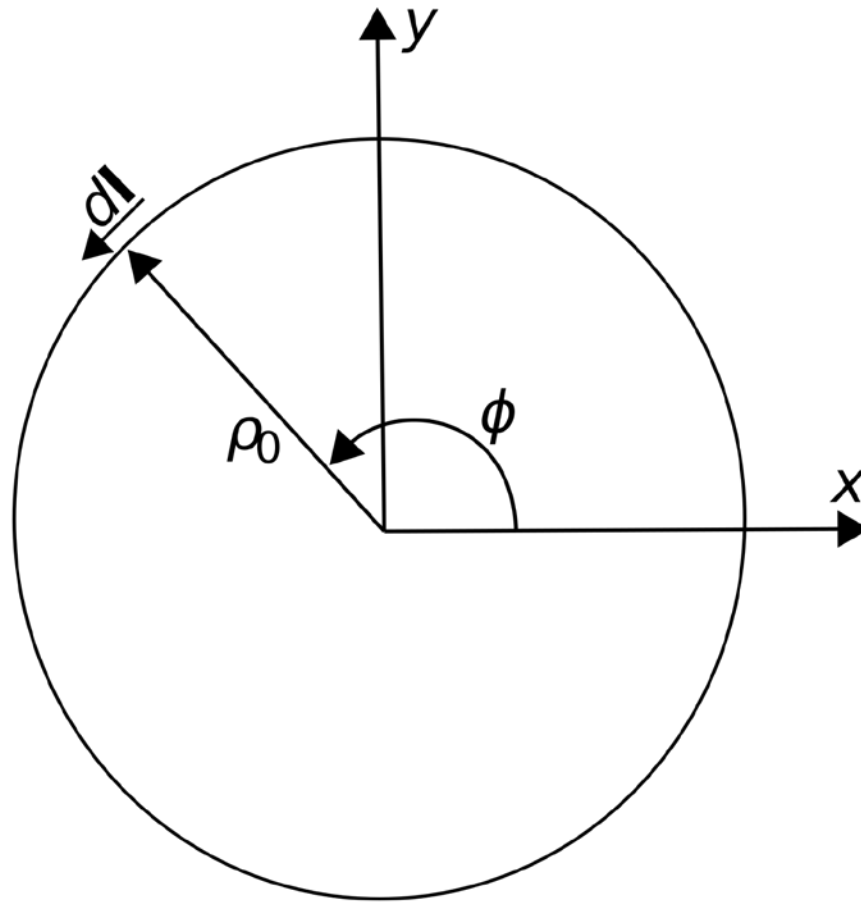


Fig. 4.13: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:Cylindrical\\_Coordinates\\_Example.svg](https://commons.wikimedia.org/wiki/File:Cylindrical_Coordinates_Example.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

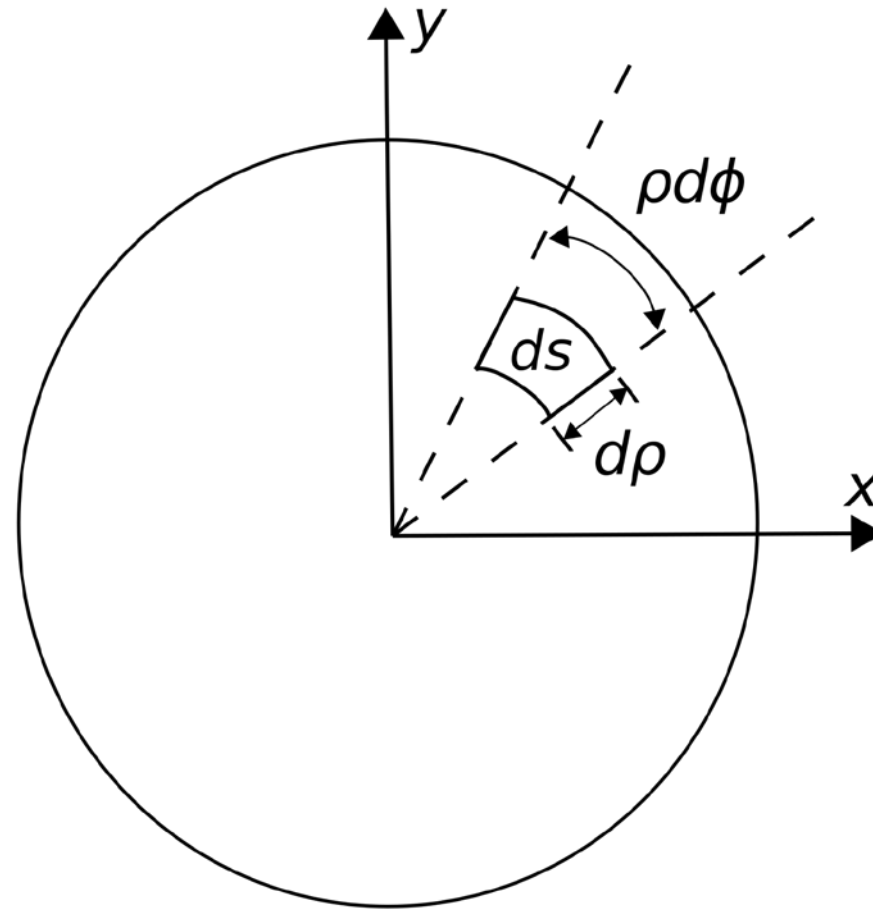


Fig. 4.14: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:Cylindrical\\_Coordinates-Area\\_of\\_a\\_Circle.svg](https://commons.wikimedia.org/wiki/File:Cylindrical_Coordinates-Area_of_a_Circle.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

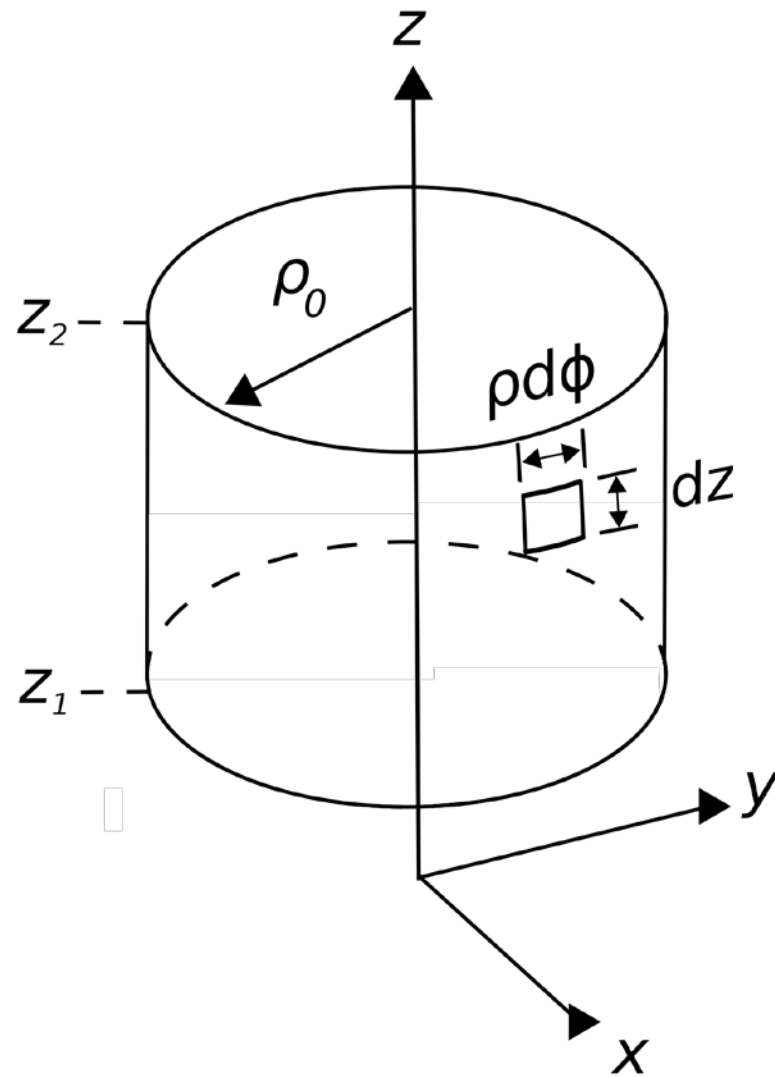


Fig. 4.15: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0096\\_CylinderArea.svg](https://commons.wikimedia.org/wiki/File:M0096_CylinderArea.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

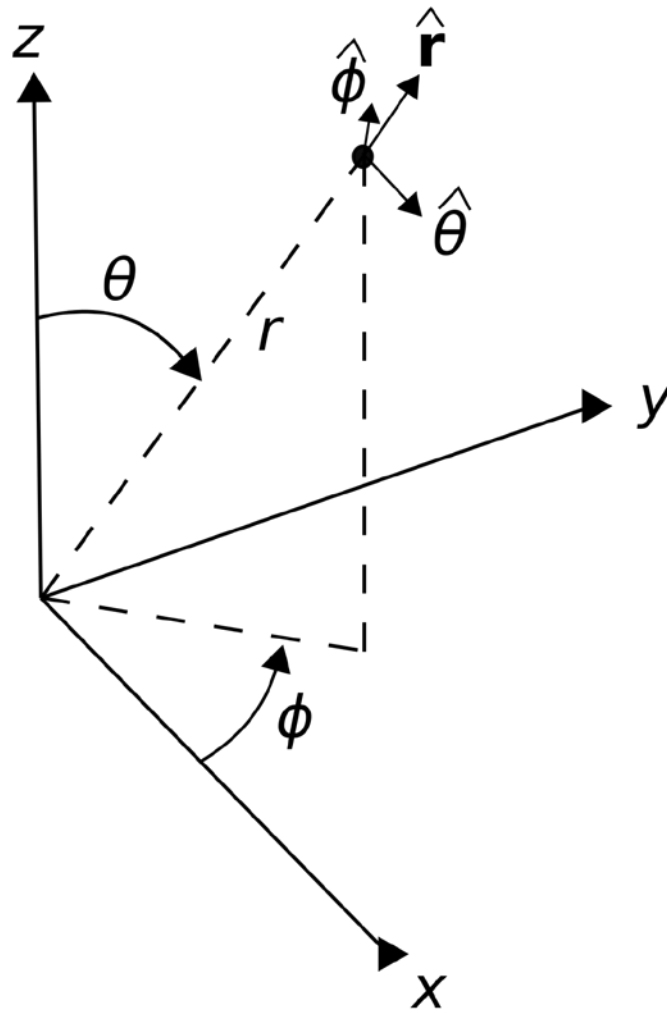


Fig. 4.16: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:Spherical\\_Coordinate\\_System.svg](https://commons.wikimedia.org/wiki/File:Spherical_Coordinate_System.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

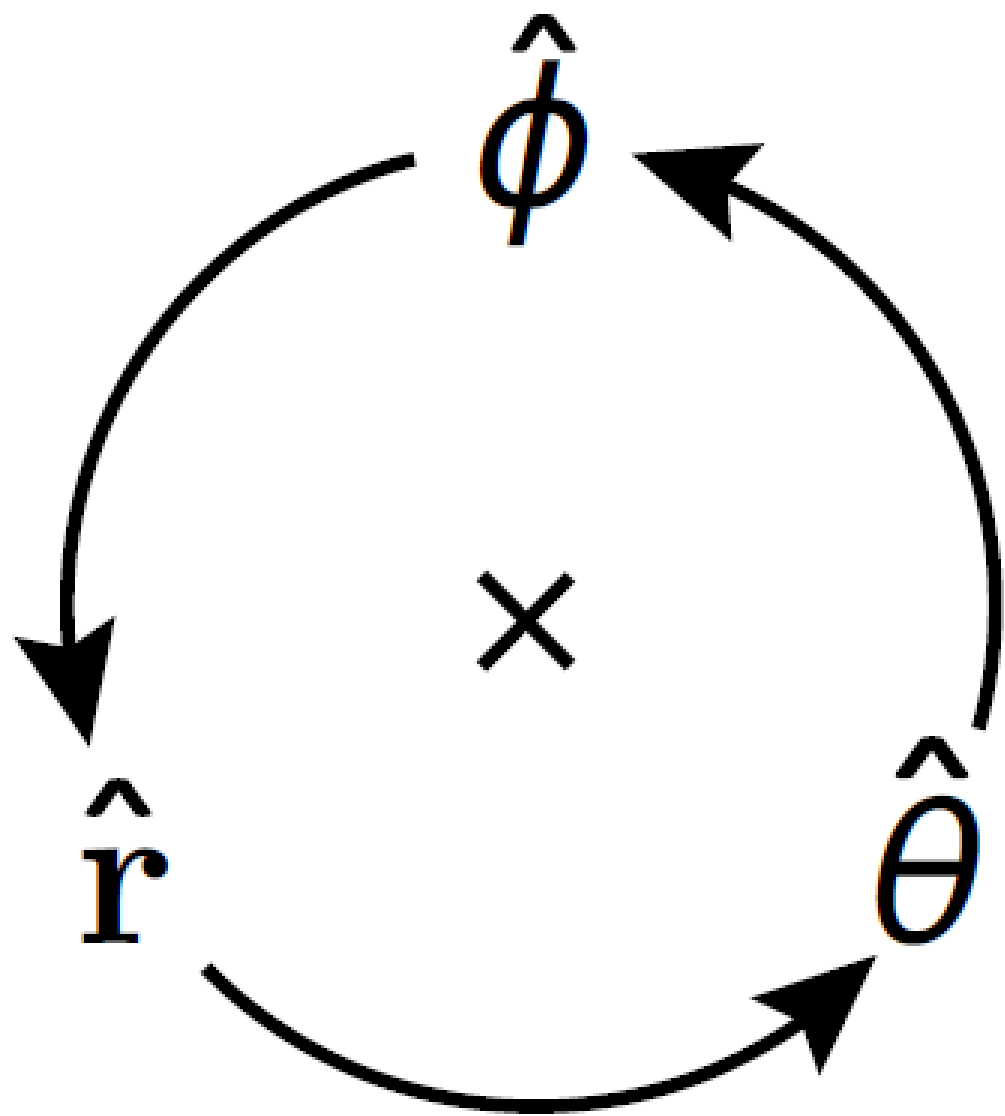


Fig. 4.17

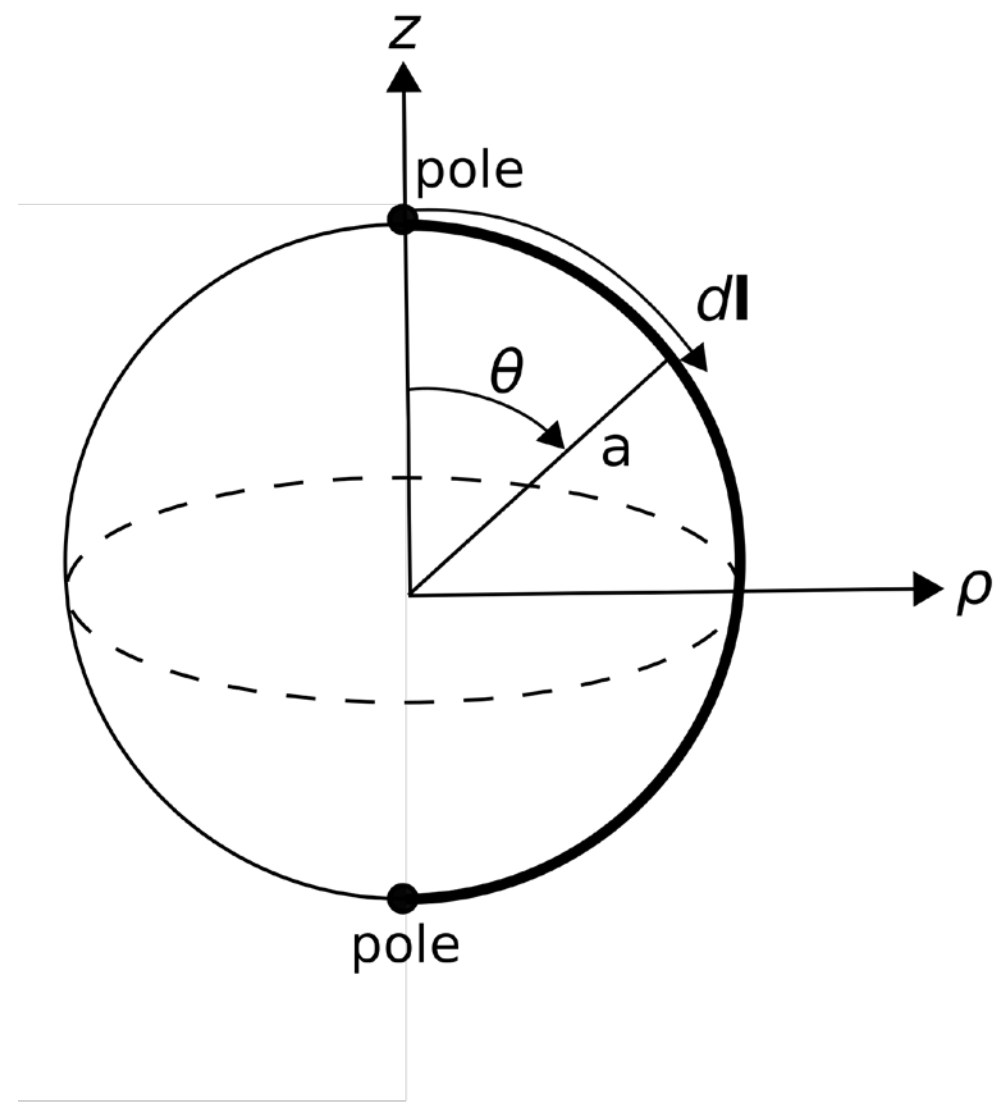


Fig. 4.18: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0097\\_fArc.svg](https://commons.wikimedia.org/wiki/File:M0097_fArc.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

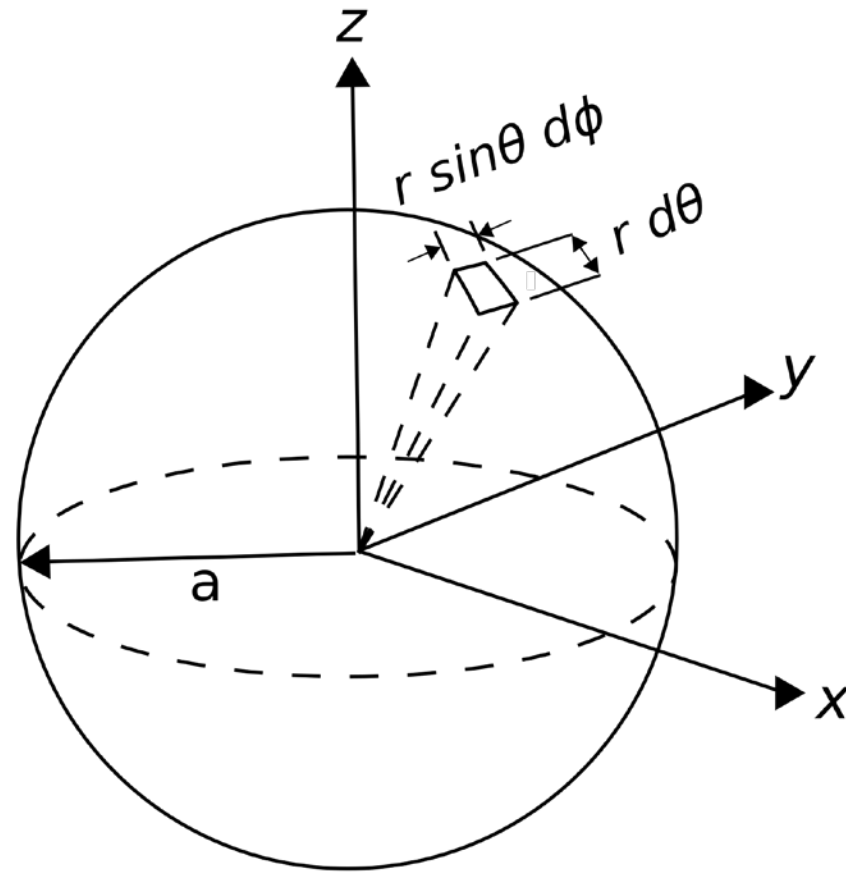


Fig. 4.19: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0097\\_fSphereArea.svg](https://commons.wikimedia.org/wiki/File:M0097_fSphereArea.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

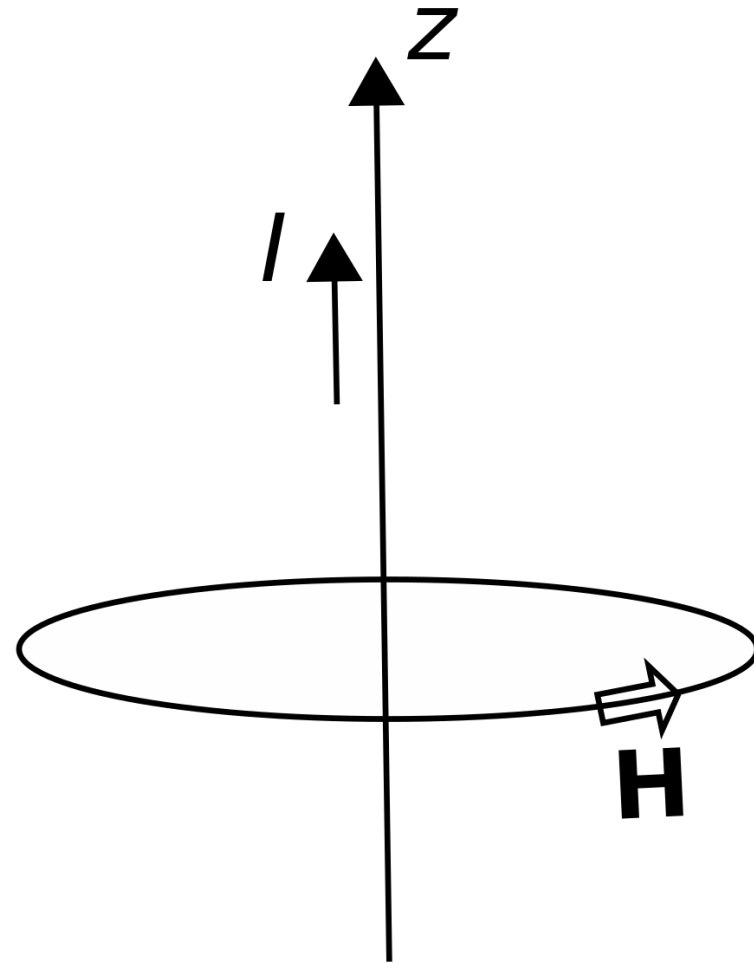


Fig. 4.20: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:Biot Savart Example.svg](https://commons.wikimedia.org/wiki/File:Biot_Savart_Example.svg),  
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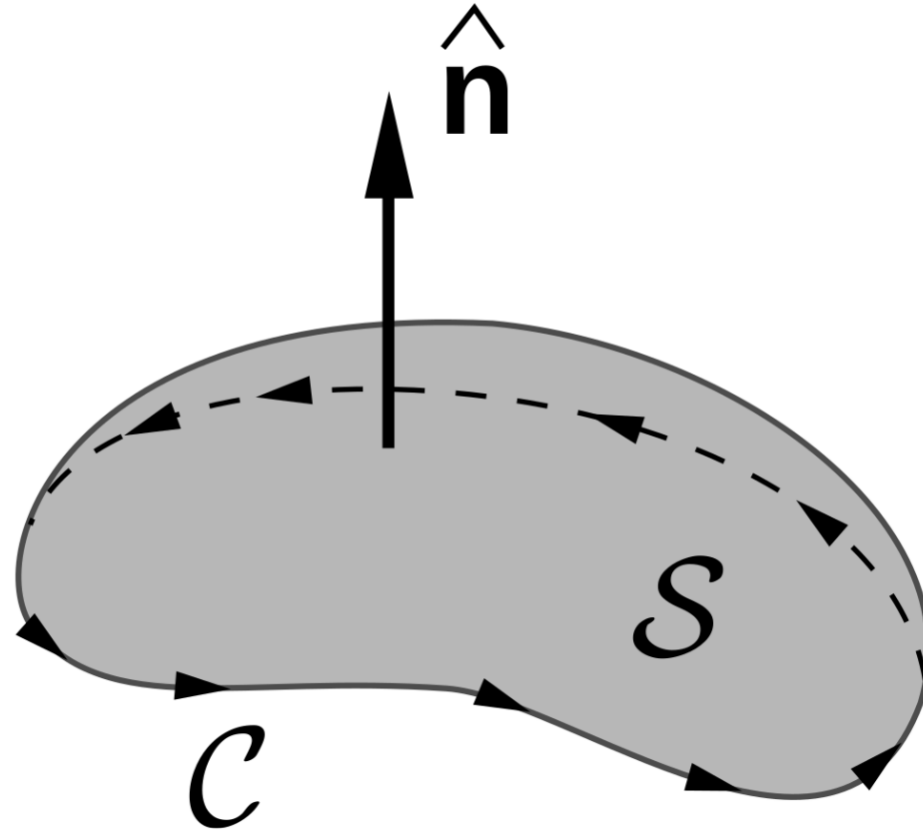


Fig. 4.21: © Cronholm144, <https://en.wikipedia.org/wiki/File:Stokes' Theorem.svg>, CC BY SA 3.0 (<https://creativecommons.org/licenses/by-sa/3.0/>). Heavily modified by author.

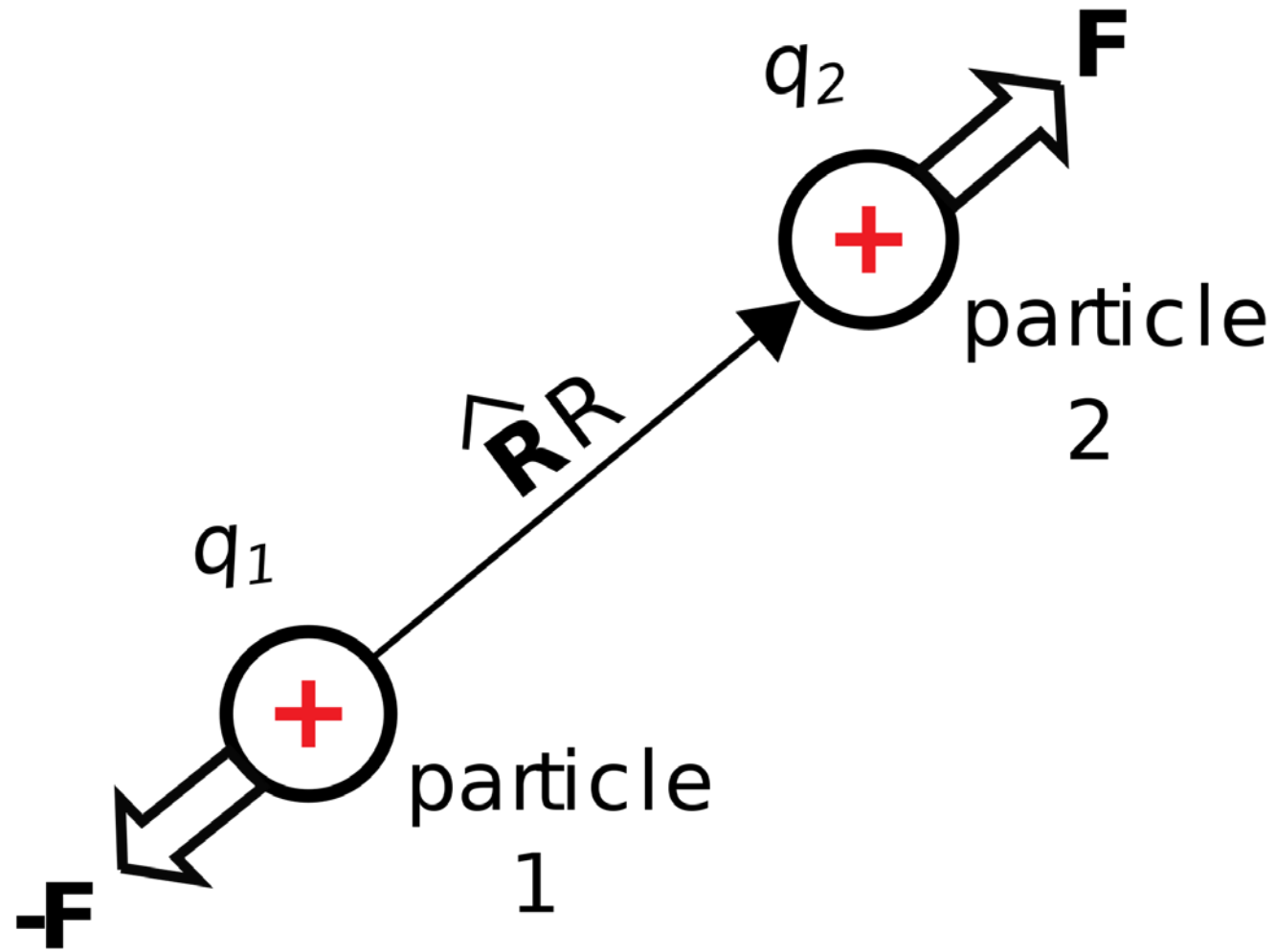


Fig. 5.1: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0102\\_fCoulombsLaw.svg](https://commons.wikimedia.org/wiki/File:M0102_fCoulombsLaw.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

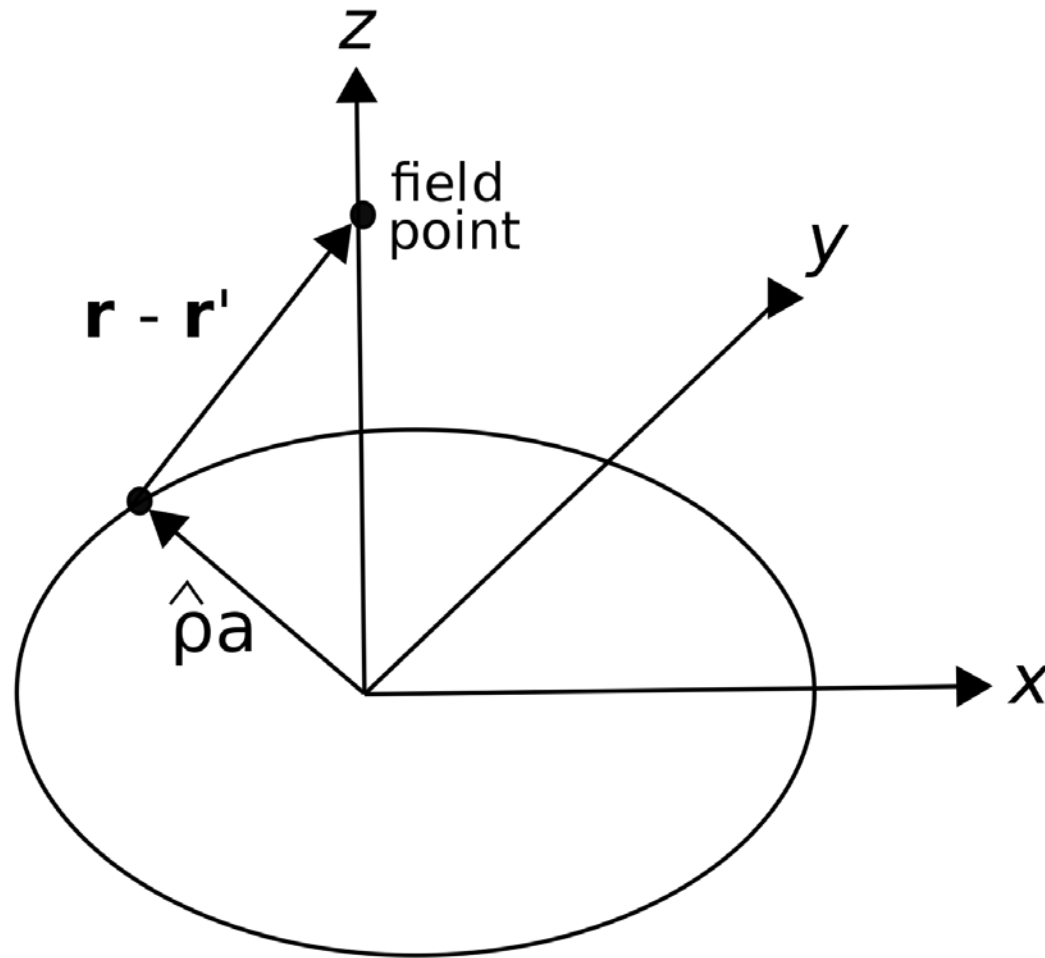


Fig. 5.2: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0104\\_fRing.svg](https://commons.wikimedia.org/wiki/File:M0104_fRing.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

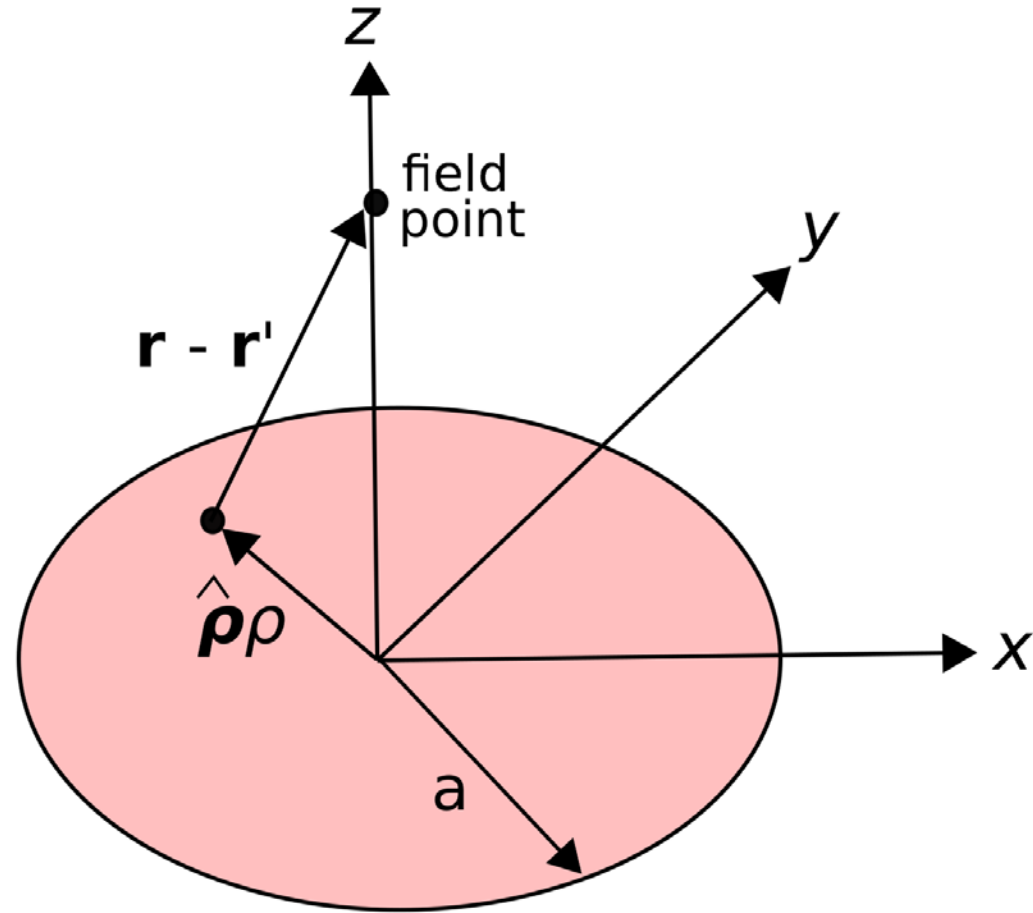


Fig. 5.3: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0104\\_fDisk.svg](https://commons.wikimedia.org/wiki/File:M0104_fDisk.svg),  
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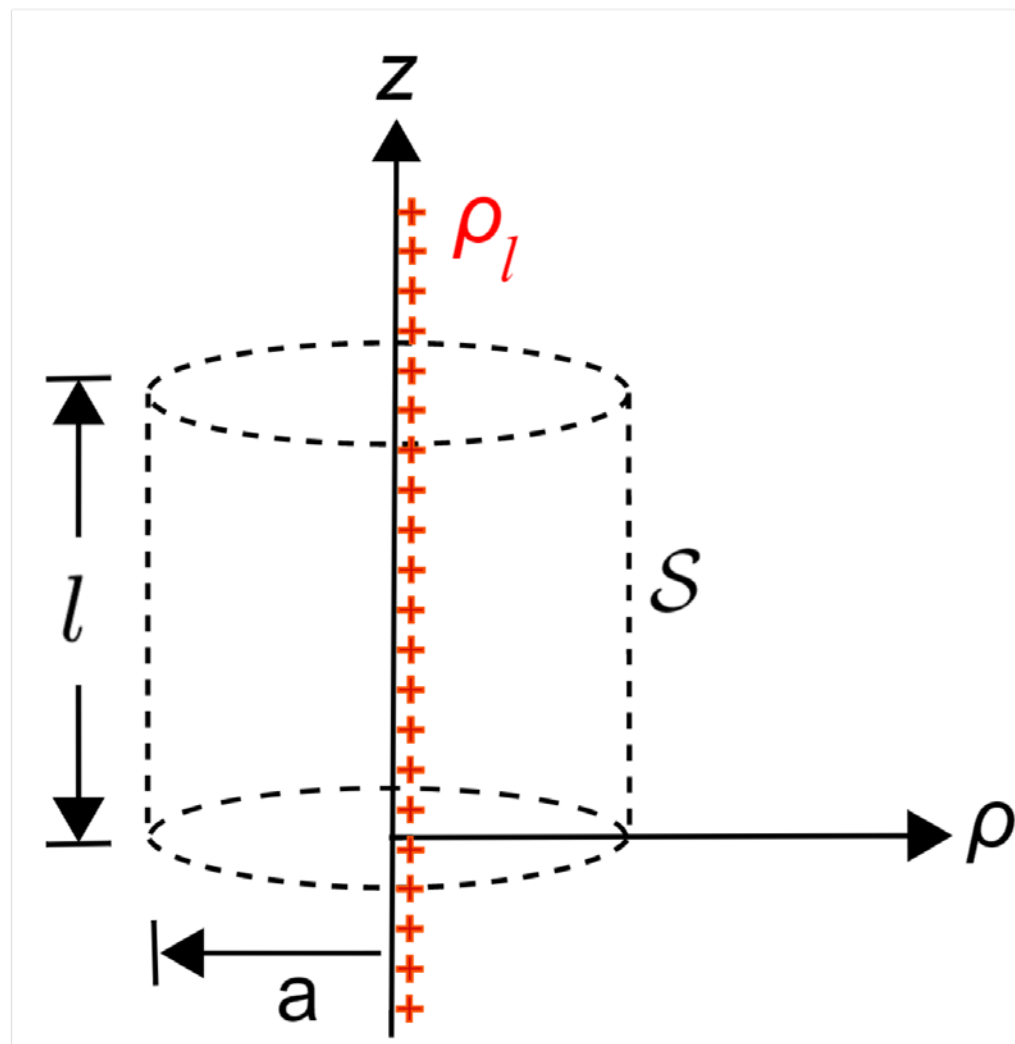


Fig. 5.4: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:4.5\\_m0149\\_commons.svg](https://commons.wikimedia.org/wiki/File:4.5_m0149_commons.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

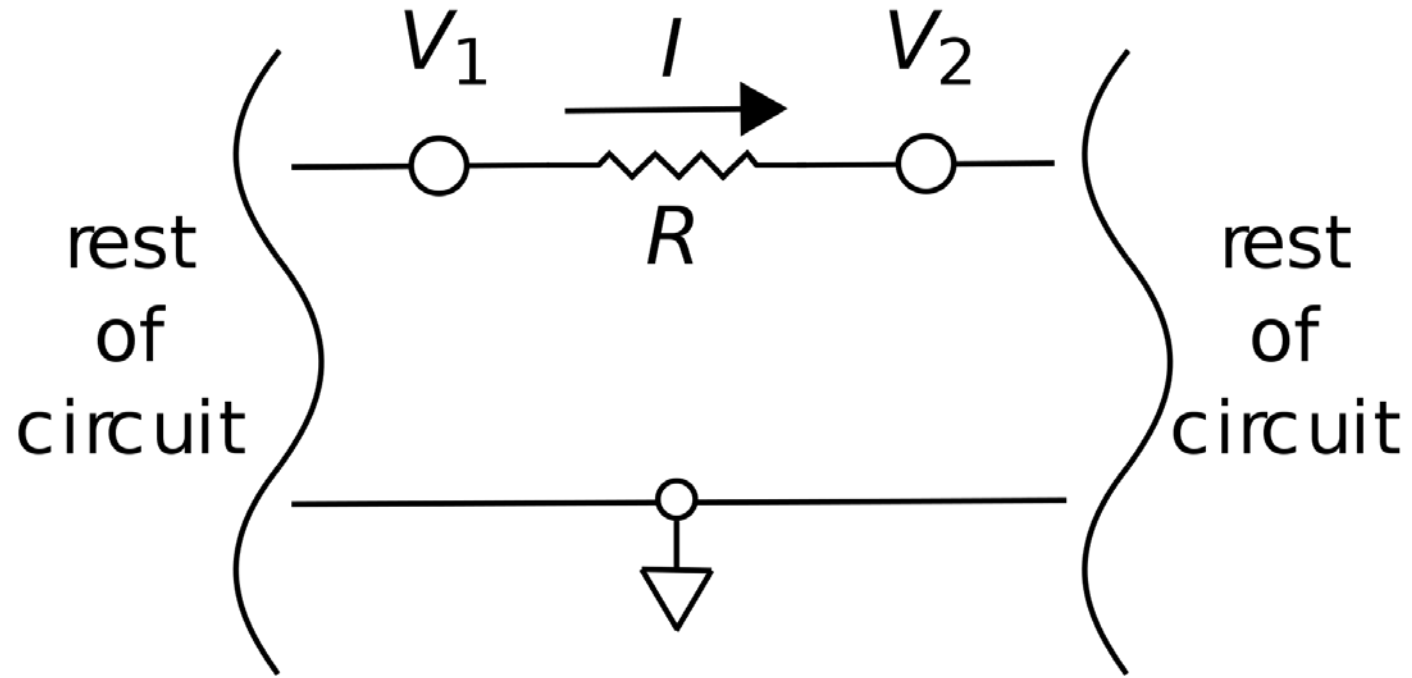


Fig. 5.5: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0064\\_fResistor.svg](https://commons.wikimedia.org/wiki/File:M0064_fResistor.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

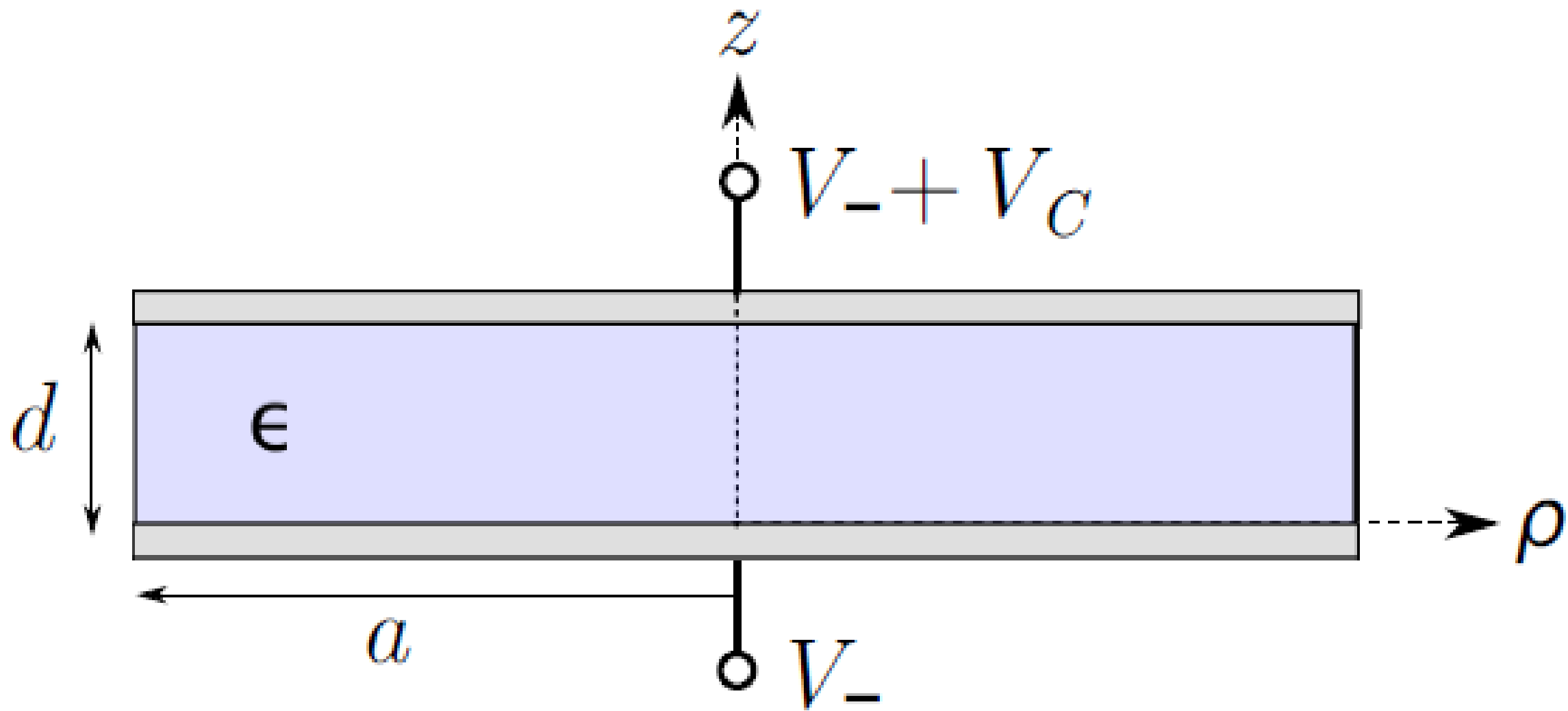


Fig. 5.6

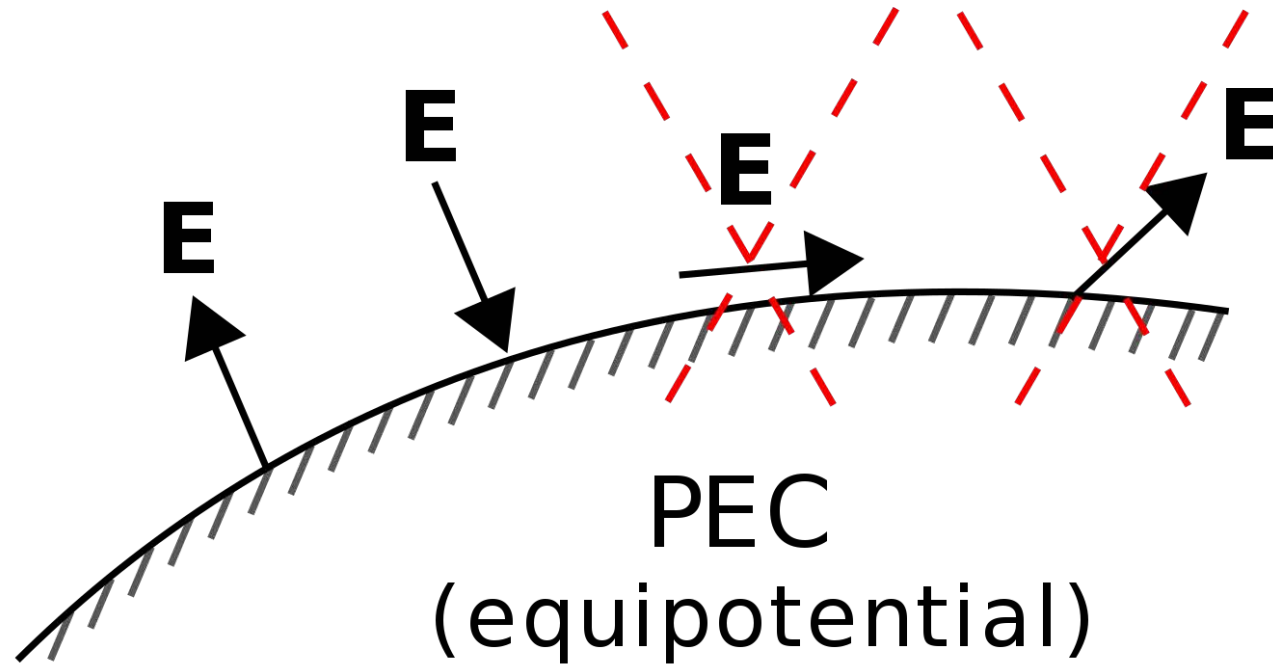


Fig. 5.7: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0020\\_fPEC.svg](https://commons.wikimedia.org/wiki/File:M0020_fPEC.svg),  
CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

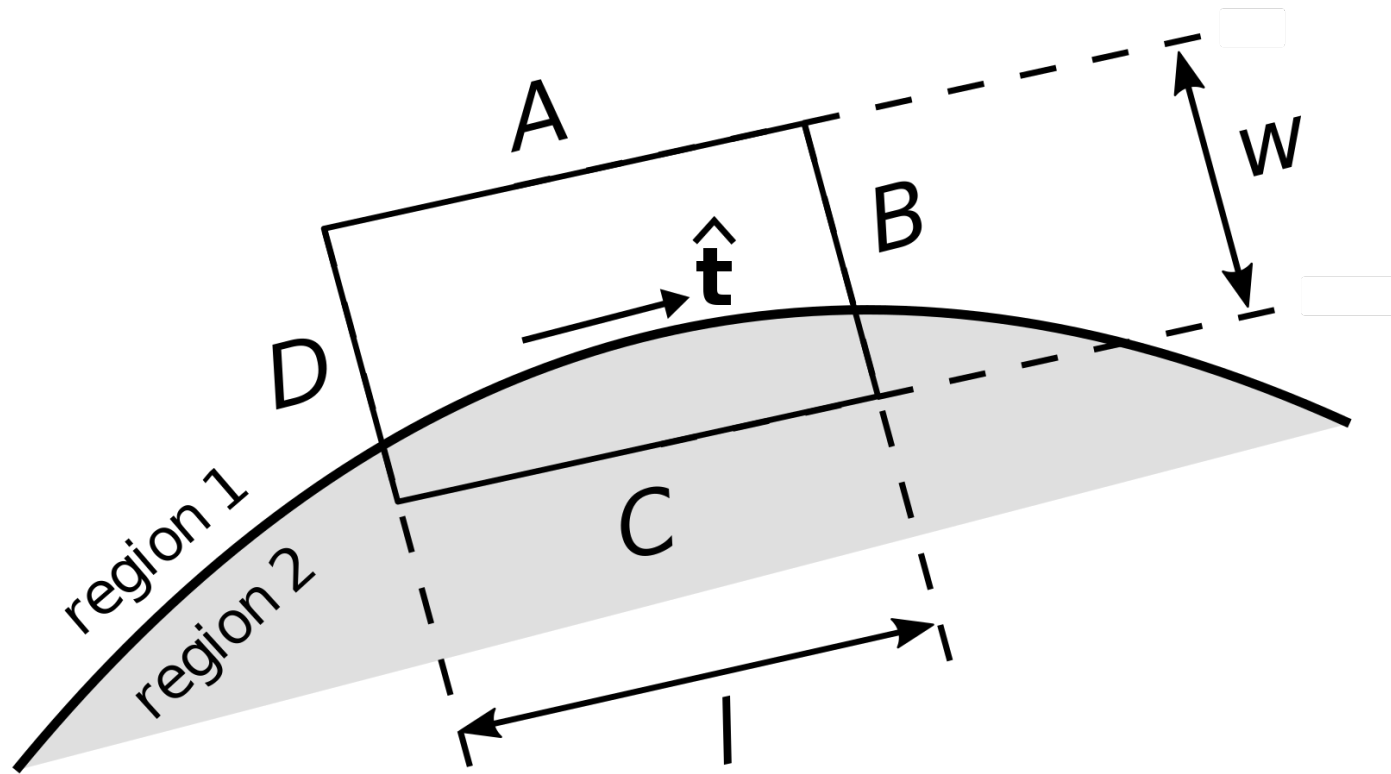


Fig. 5.8: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0020\\_fKVL.svg](https://commons.wikimedia.org/wiki/File:M0020_fKVL.svg),  
CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

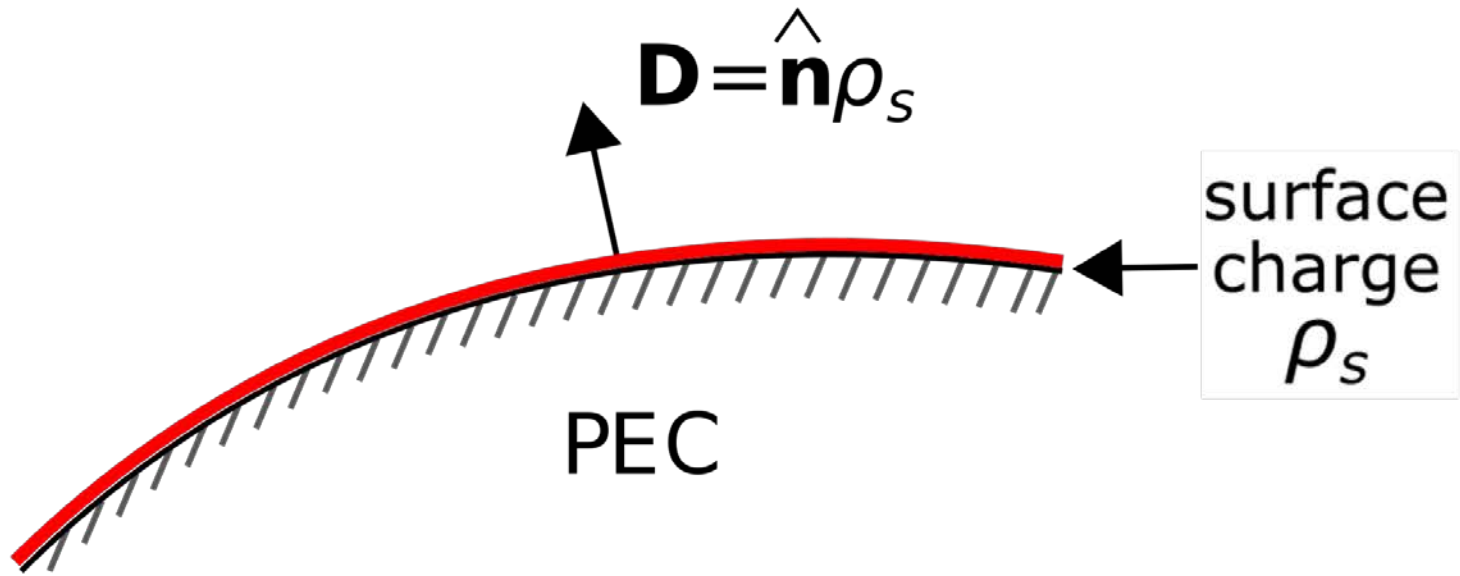


Fig. 5.9: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0021\\_fPEC.svg](https://commons.wikimedia.org/wiki/File:M0021_fPEC.svg),  
CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

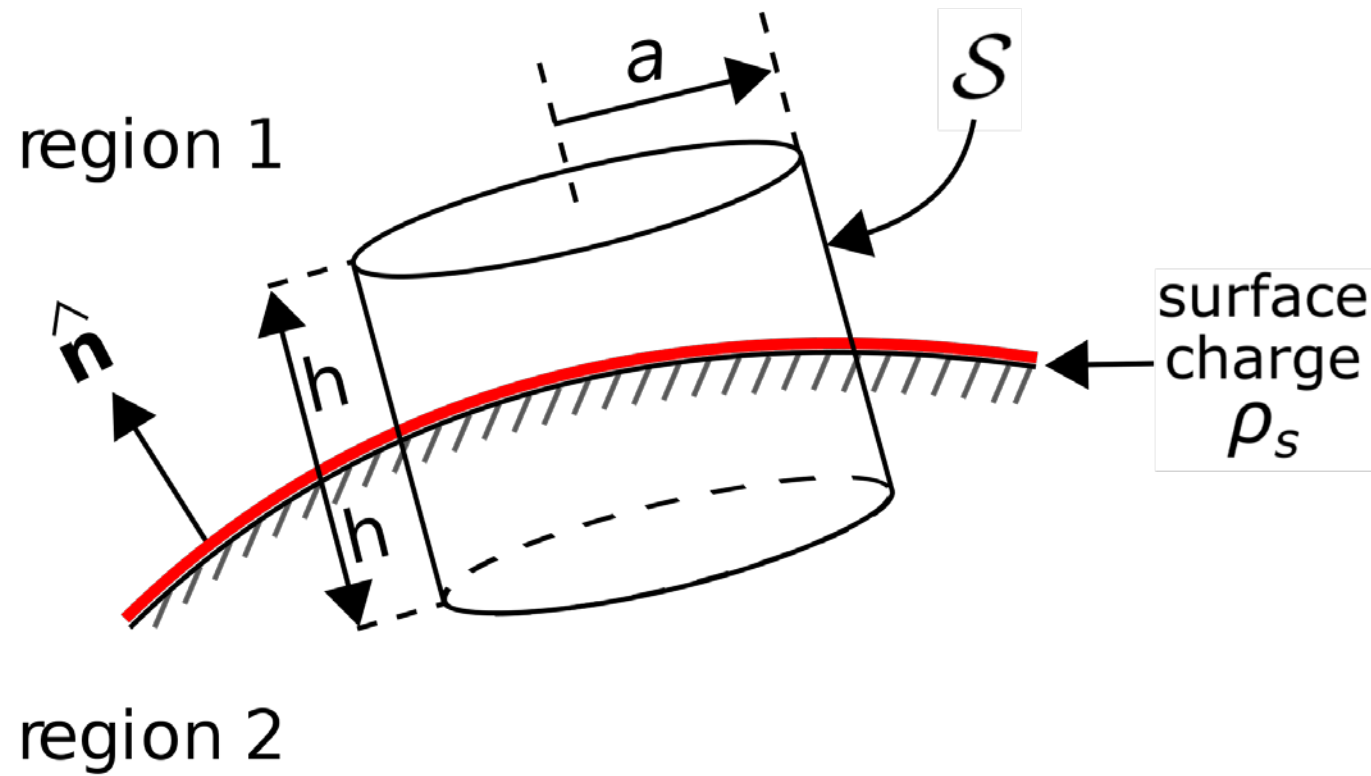


Fig. 5.10: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0021\\_fGL.svg](https://commons.wikimedia.org/wiki/File:M0021_fGL.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

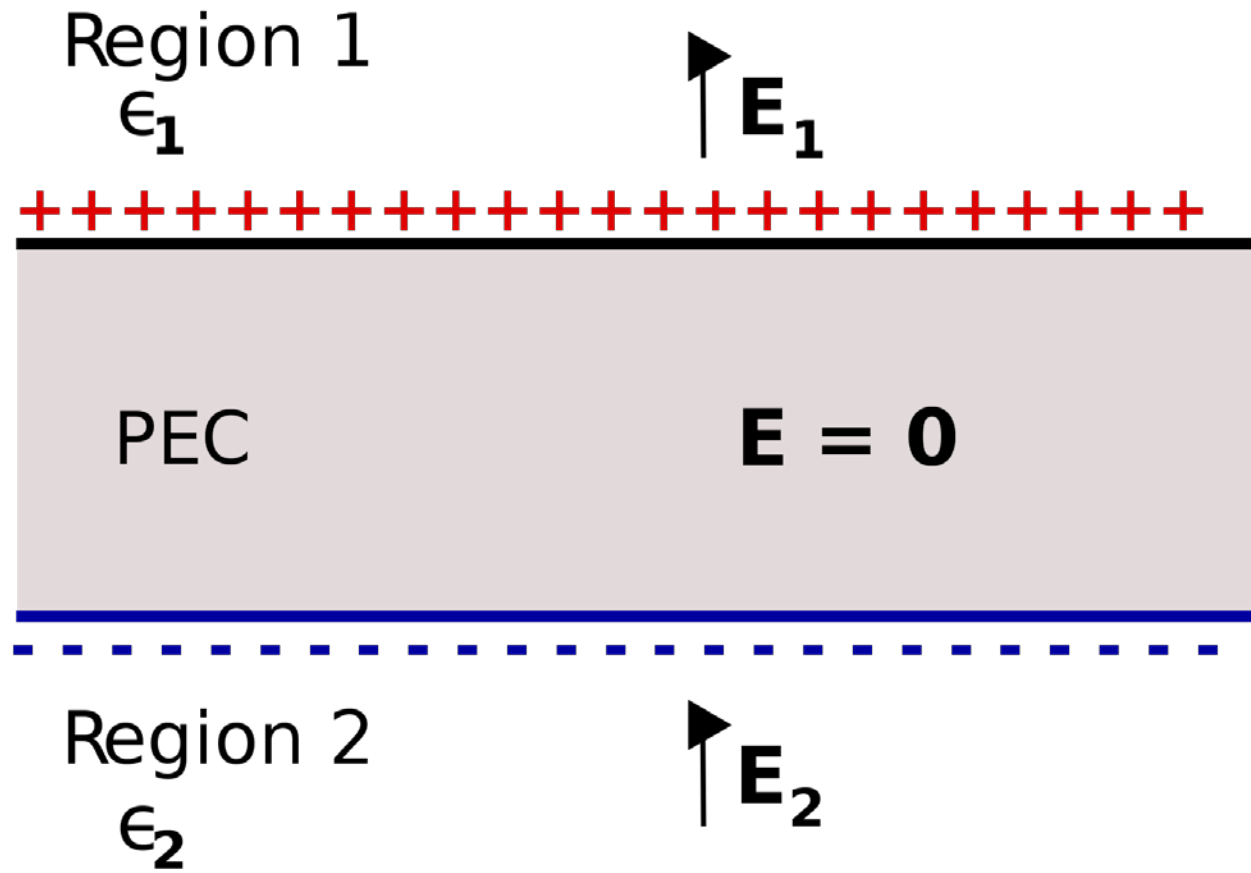


Fig. 5.11: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0025\\_fFlatSlab.svg](https://commons.wikimedia.org/wiki/File:M0025_fFlatSlab.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

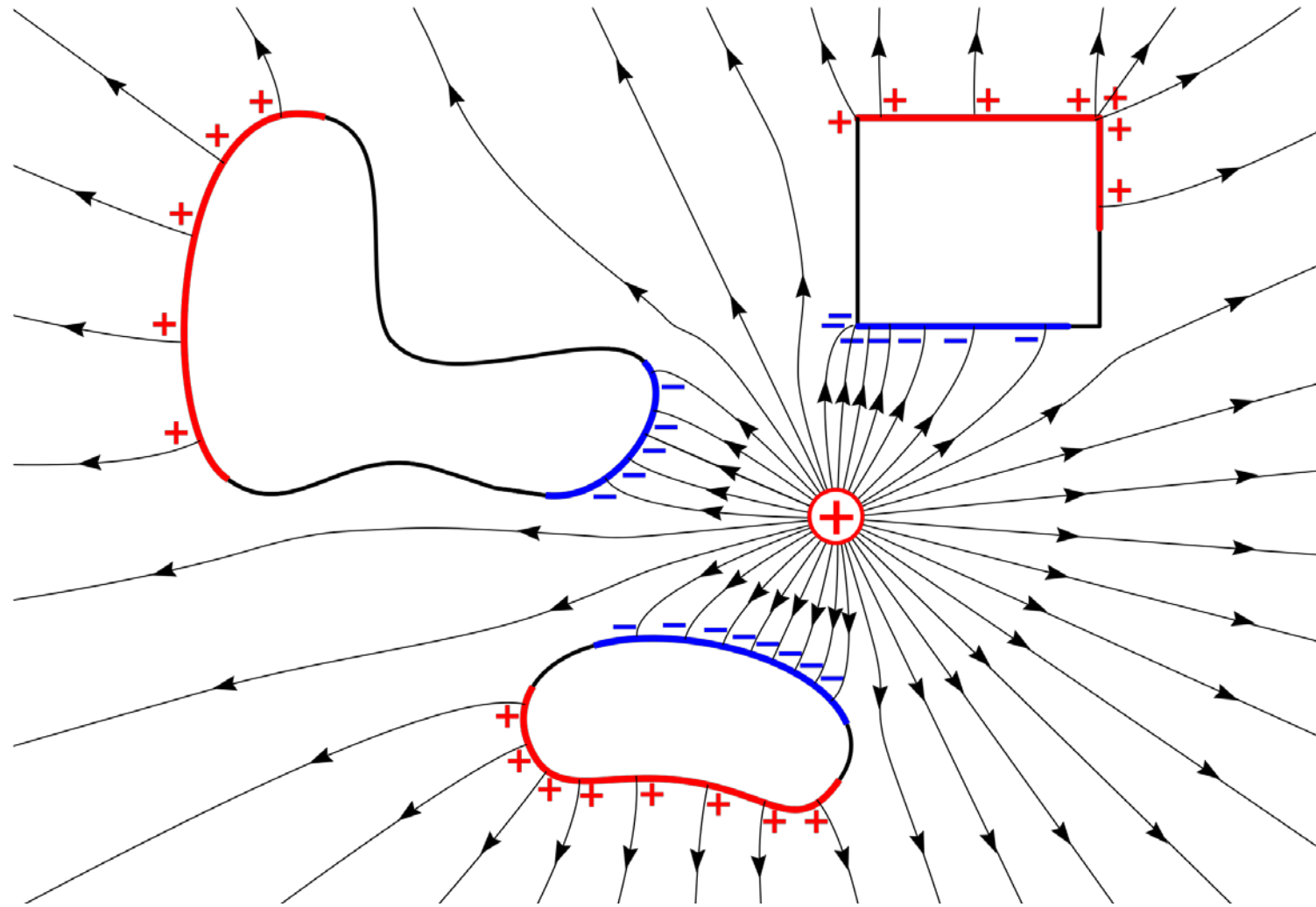


Fig. 5.12: by C. Burks, [https://commons.wikimedia.org/wiki/File:Electrostatic\\_induction.svg](https://commons.wikimedia.org/wiki/File:Electrostatic_induction.svg), in public domain. Minor modifications.

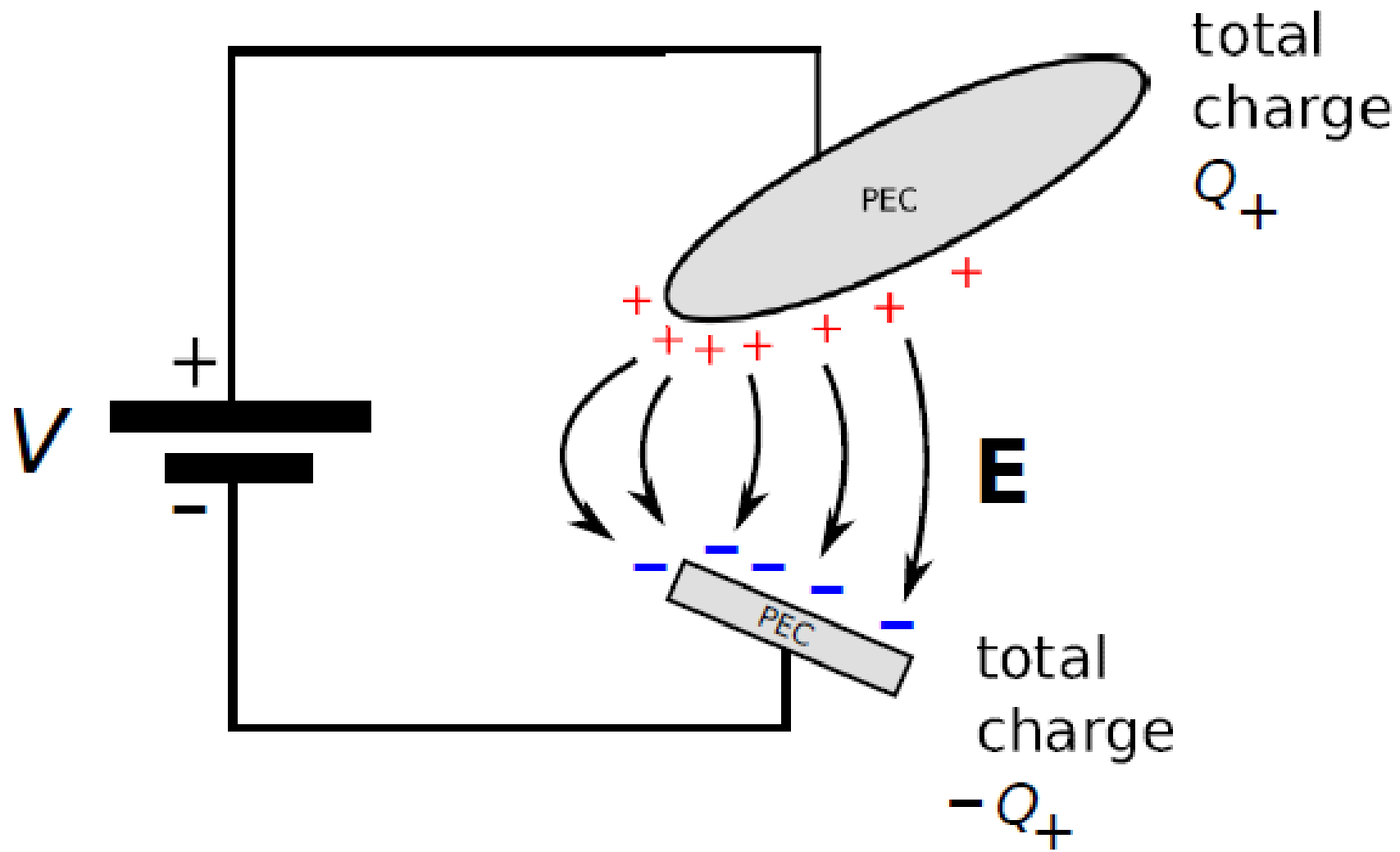


Fig. 5.13

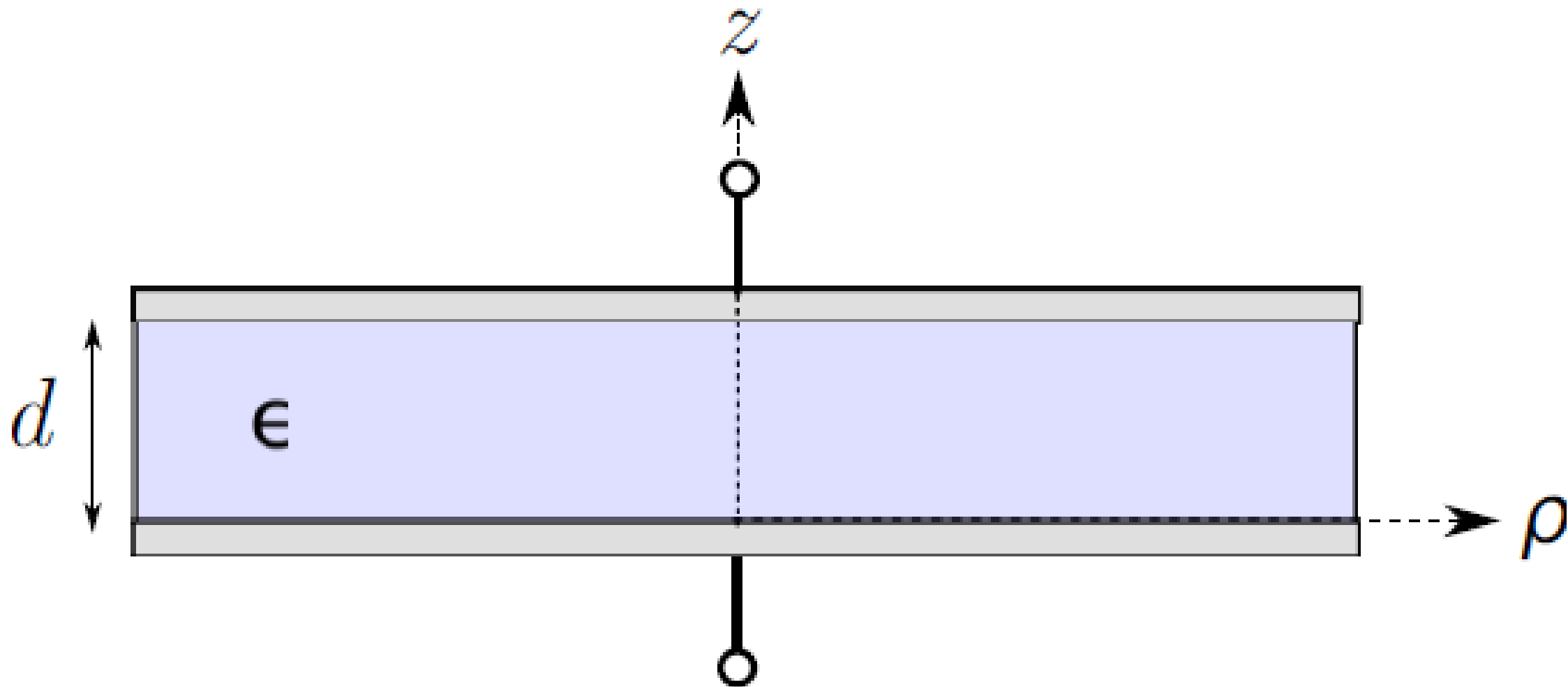


Fig. 5.14

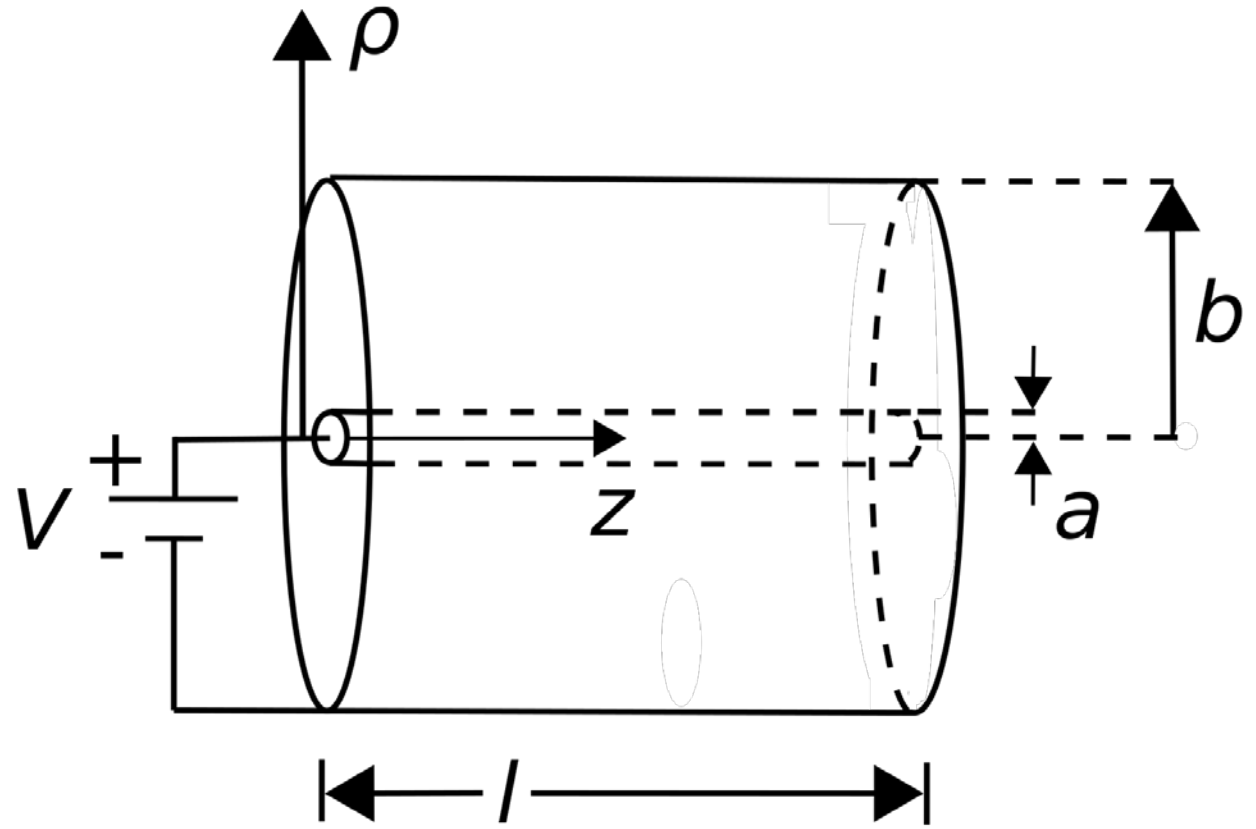


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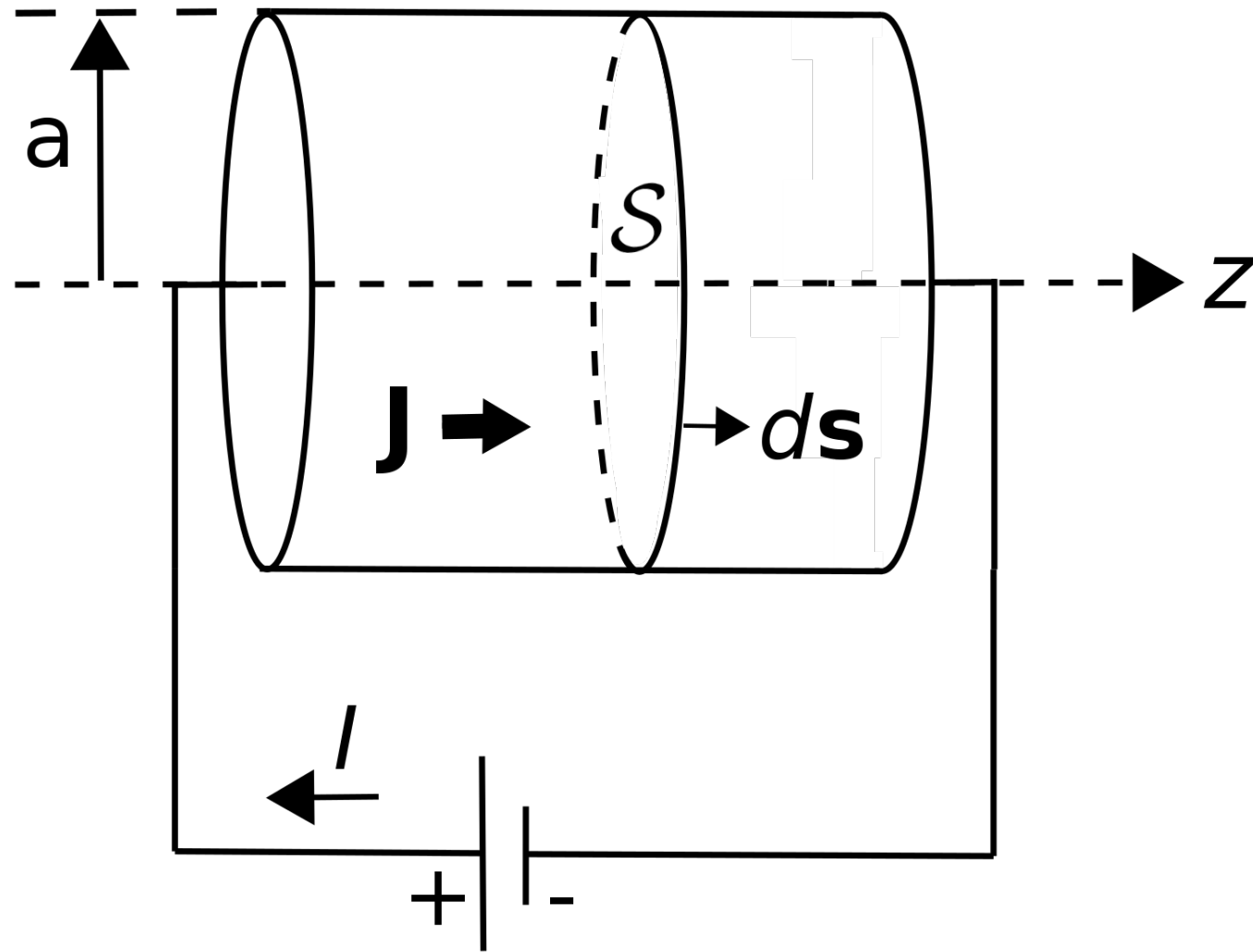


Fig. 6.1: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0101\\_fMatEx1.svg](https://commons.wikimedia.org/wiki/File:M0101_fMatEx1.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

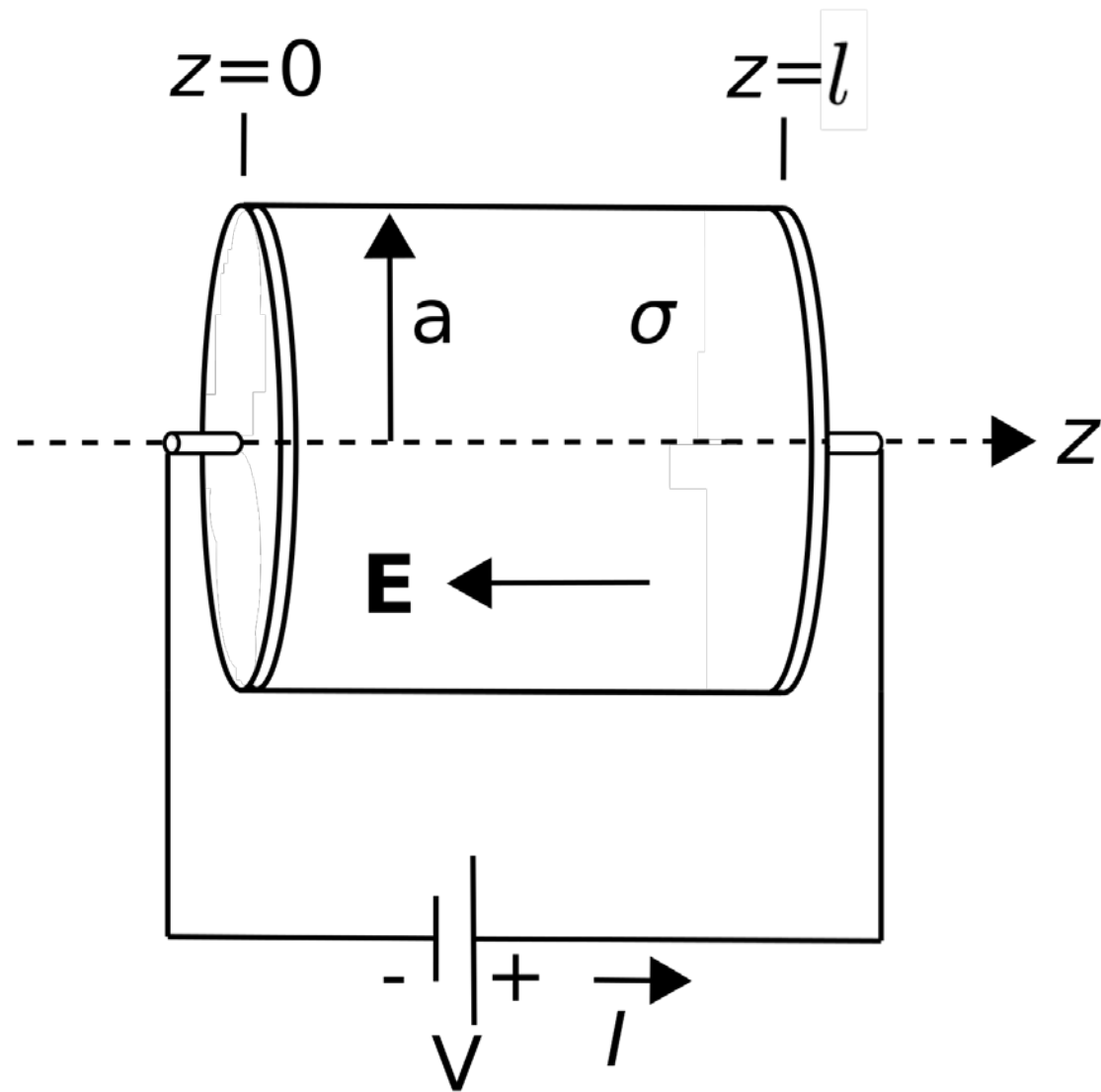


Fig. 6.2: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0071\\_fMatEx1.svg](https://commons.wikimedia.org/wiki/File:M0071_fMatEx1.svg), CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>).

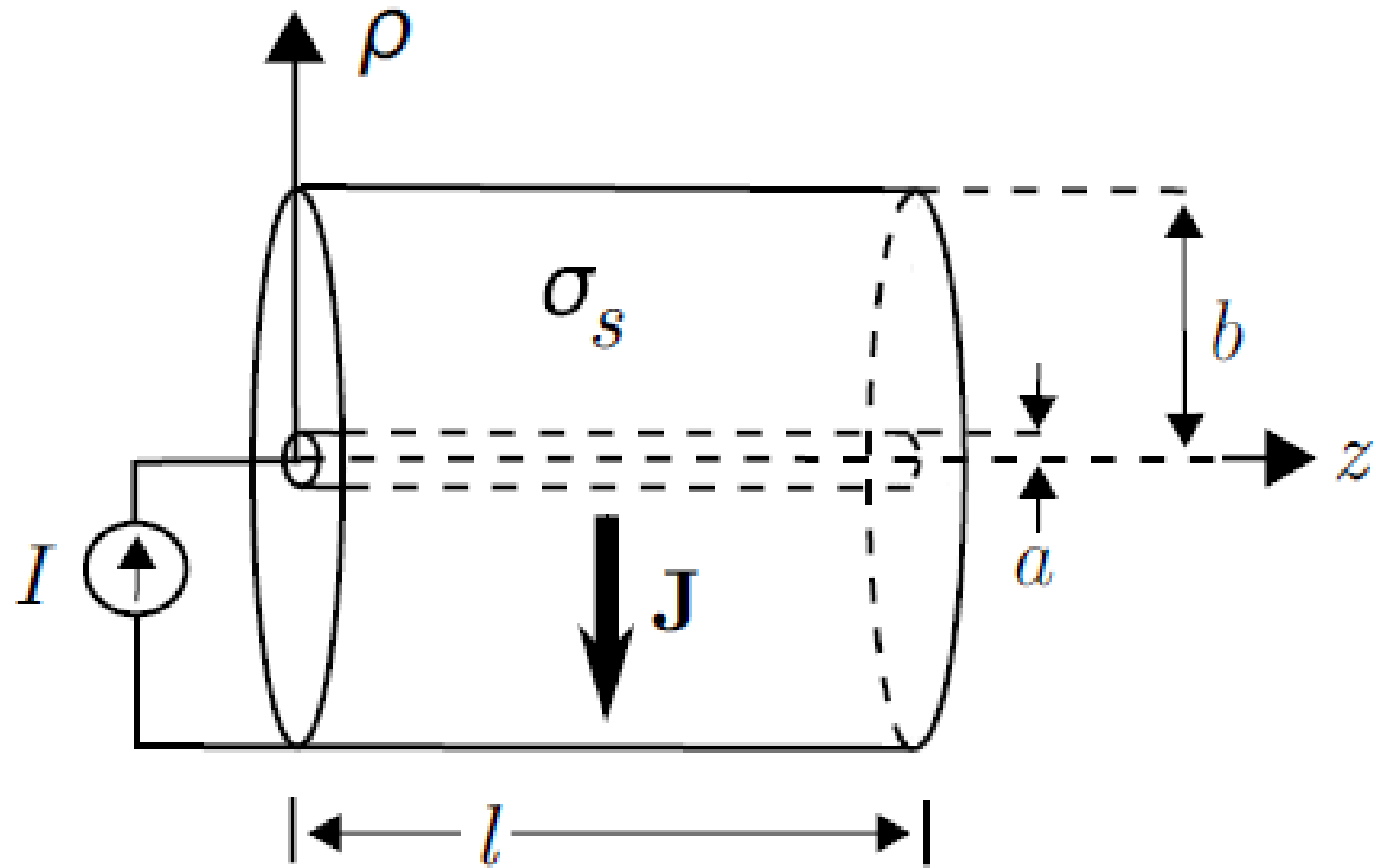


Fig. 6.3

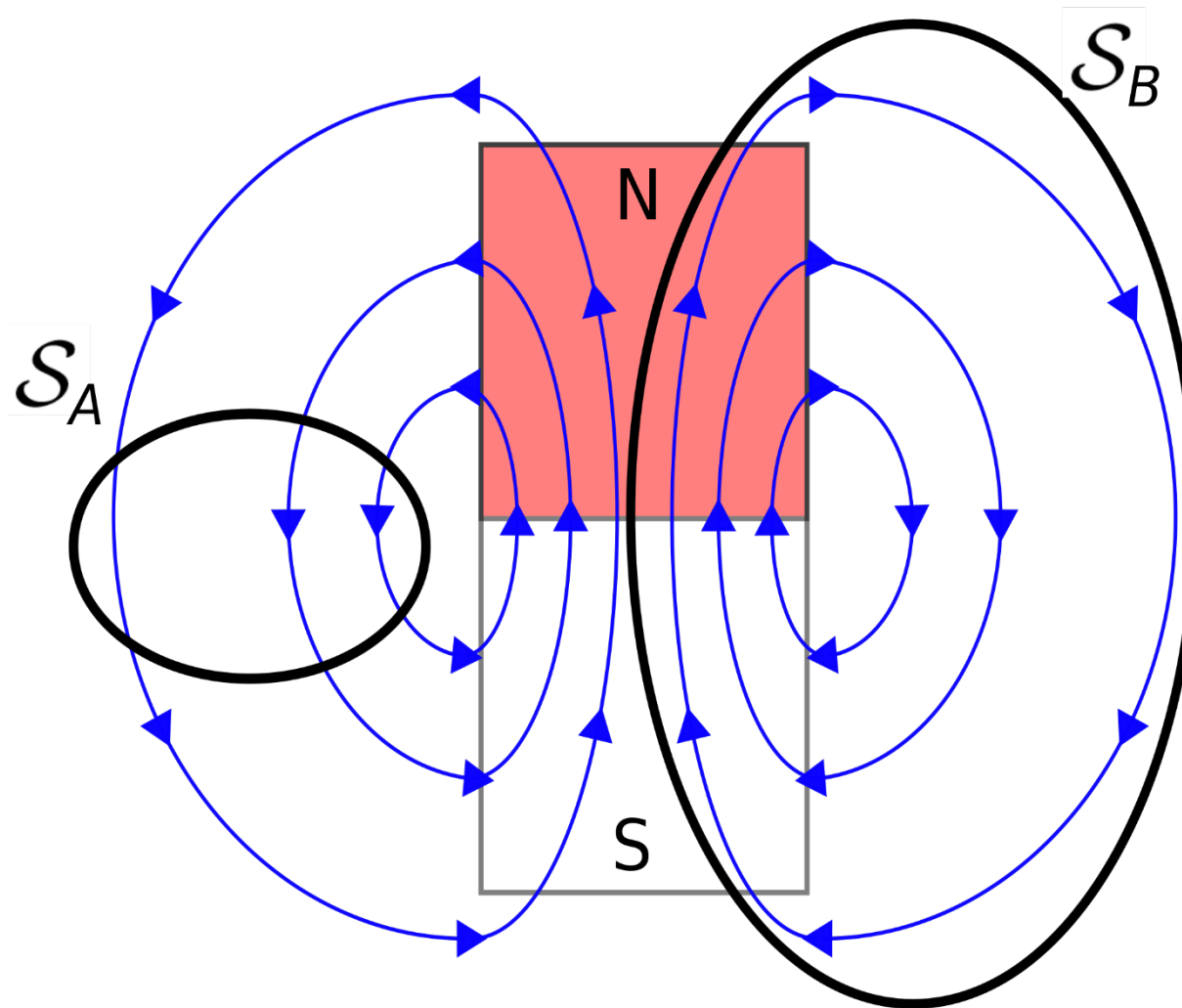


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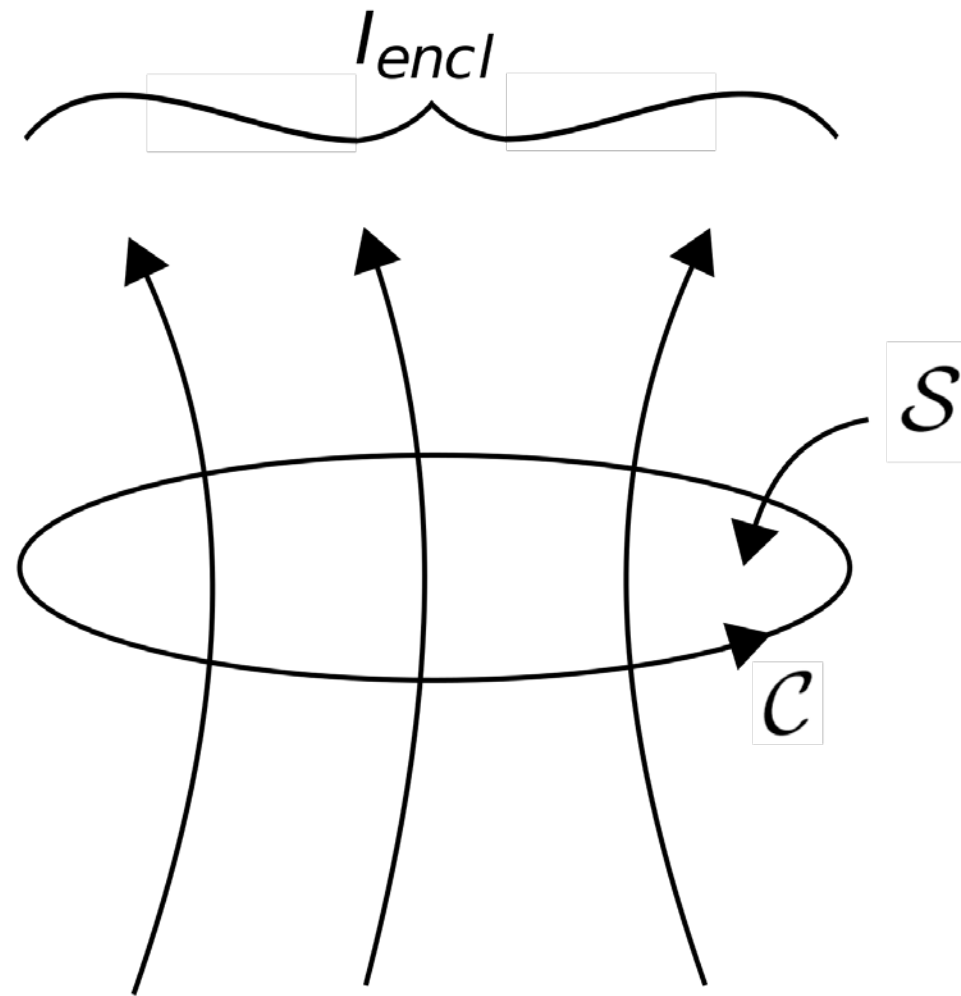


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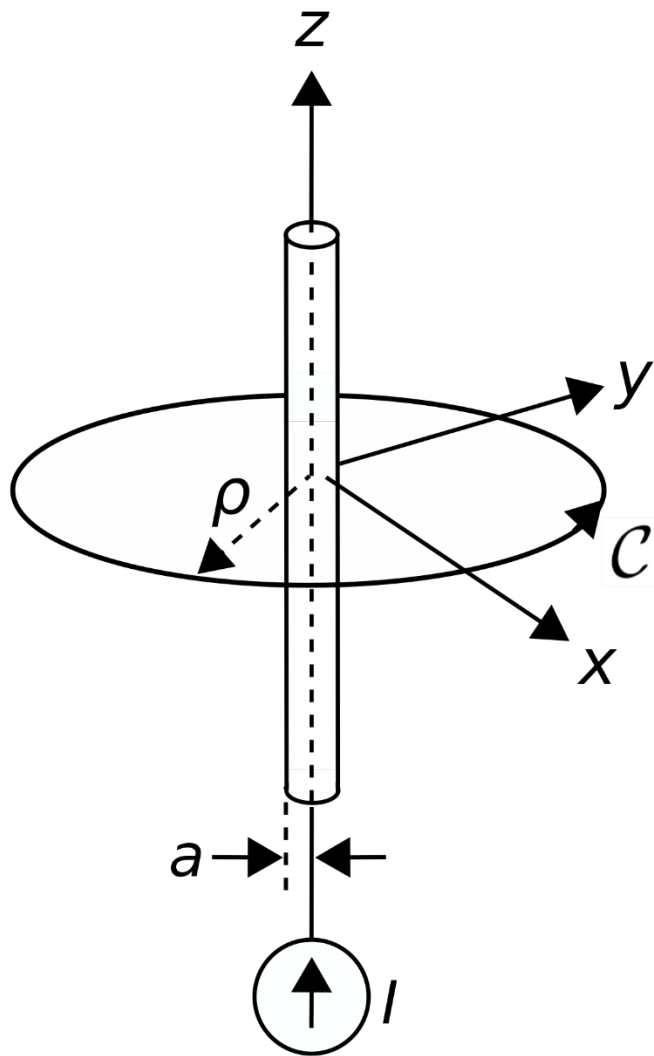


Fig. 7.3: © K. Kikkeri, [https://commons.wikimedia.org/wiki/File:M0119\\_fLSW.svg](https://commons.wikimedia.org/wiki/File:M0119_fLSW.svg),  
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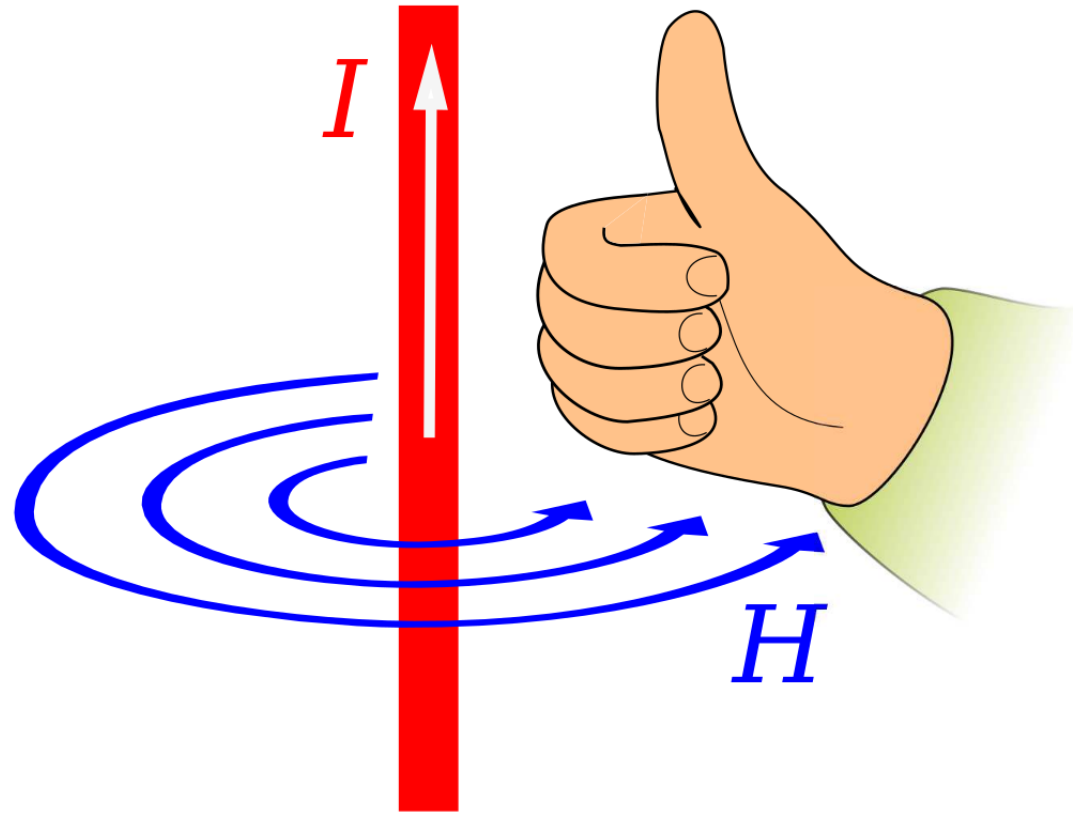


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CC BY SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>), modified.

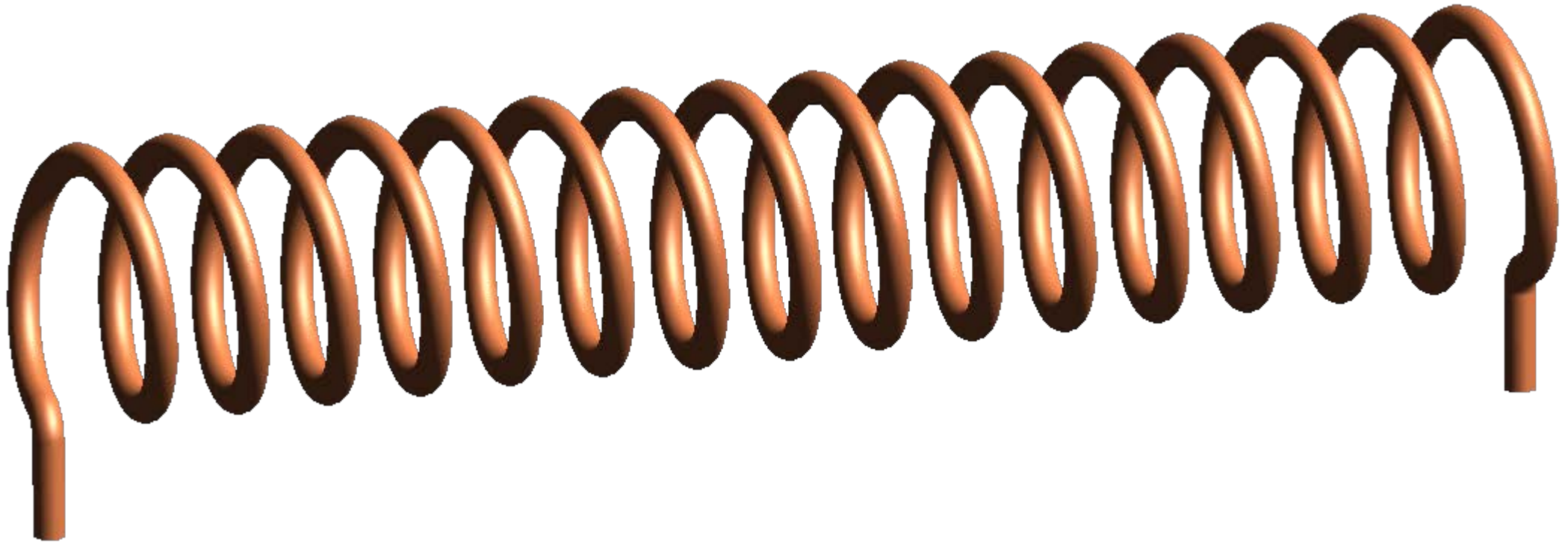


Fig. 7.5: Zureks, <https://en.wikipedia.org/wiki/File:Solenoid-1.png>, public domain.

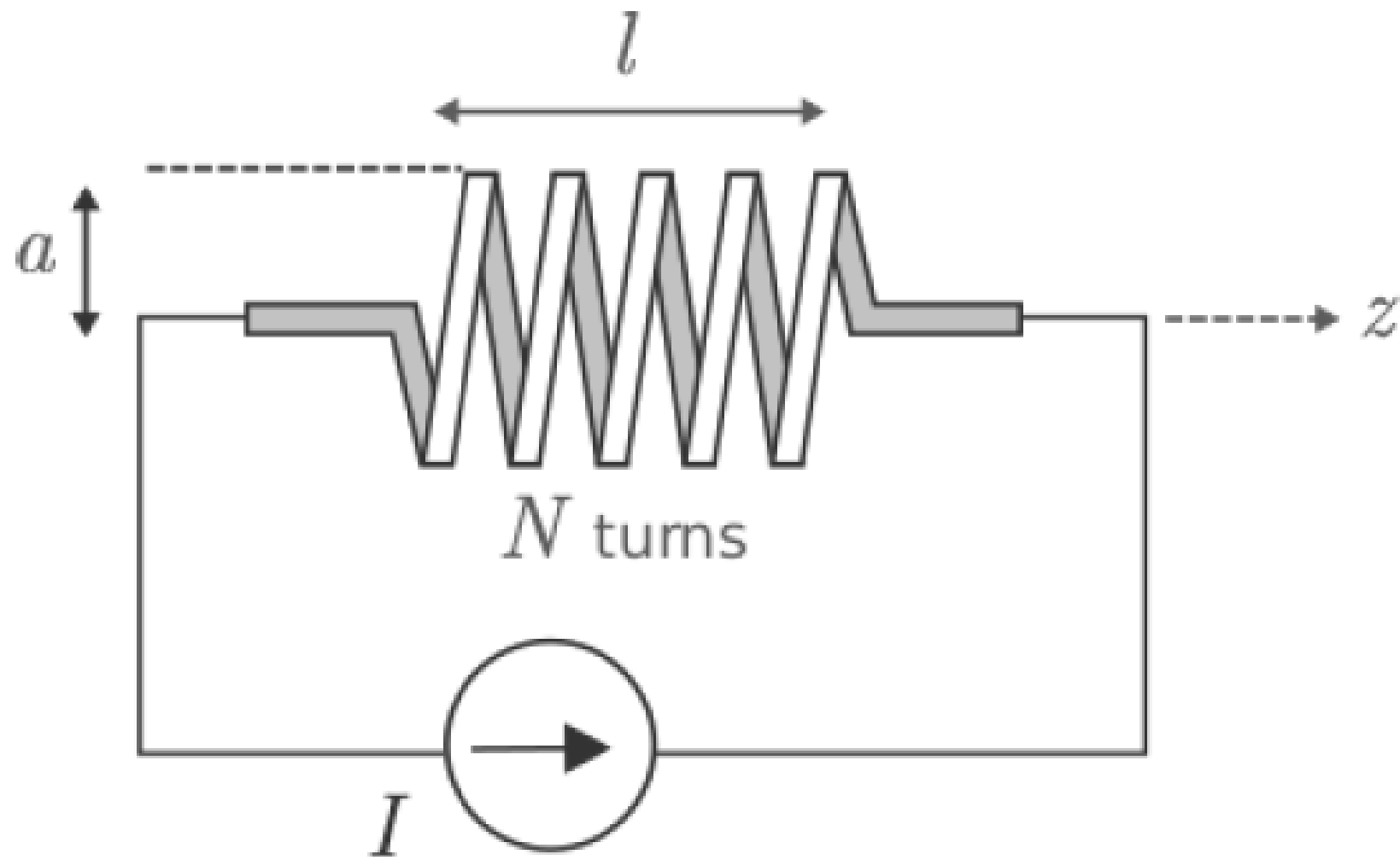


Fig. 7.6

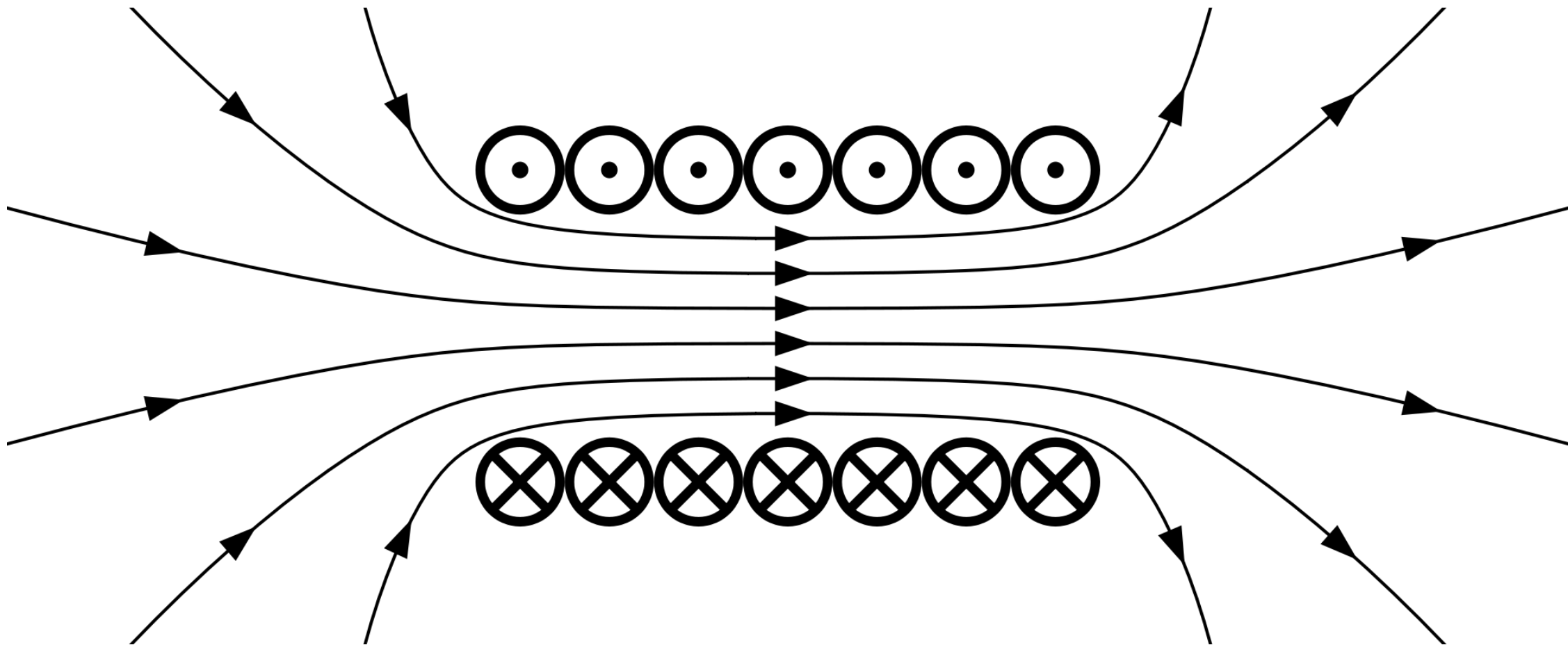


Fig. 7.7: © Geek3, [https://commons.wikimedia.org/wiki/File:VFPT\\_Solenoid\\_correct.svg](https://commons.wikimedia.org/wiki/File:VFPT_Solenoid_correct.svg),  
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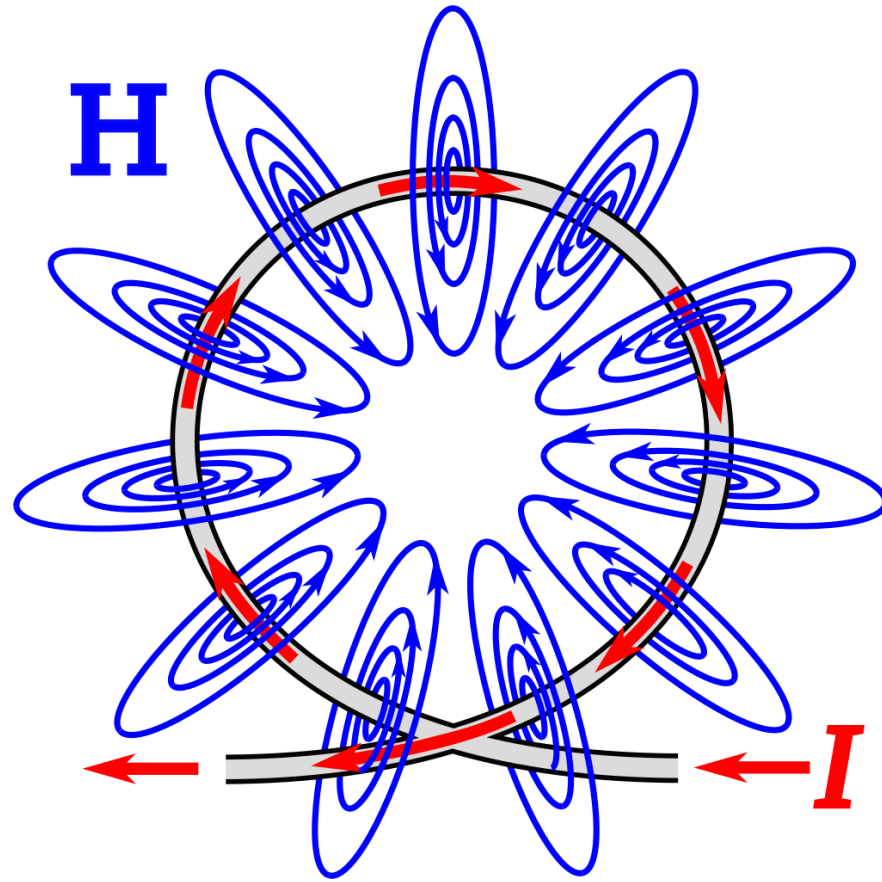


Fig. 7.8: Chetvorno, [https://en.wikipedia.org/wiki/File:Magnetic\\_field\\_of\\_loop\\_3.svg](https://en.wikipedia.org/wiki/File:Magnetic_field_of_loop_3.svg), public domain via CC0 1.0, modified.

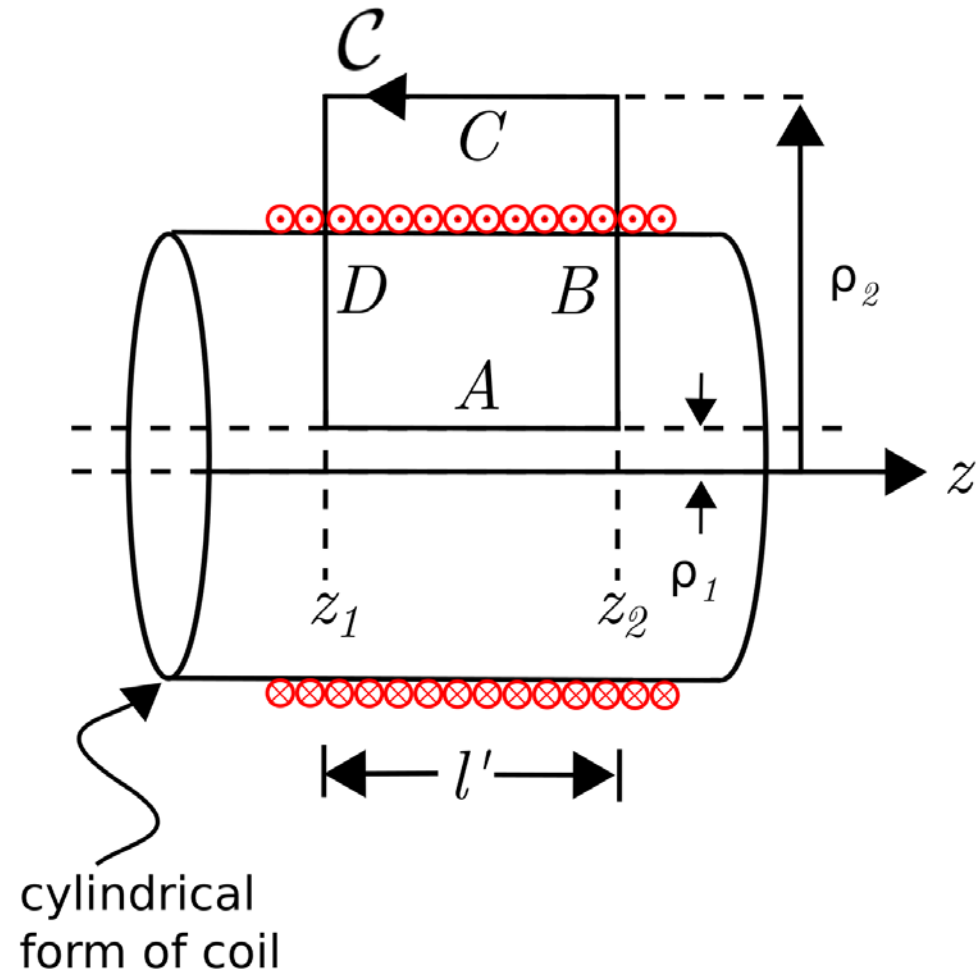


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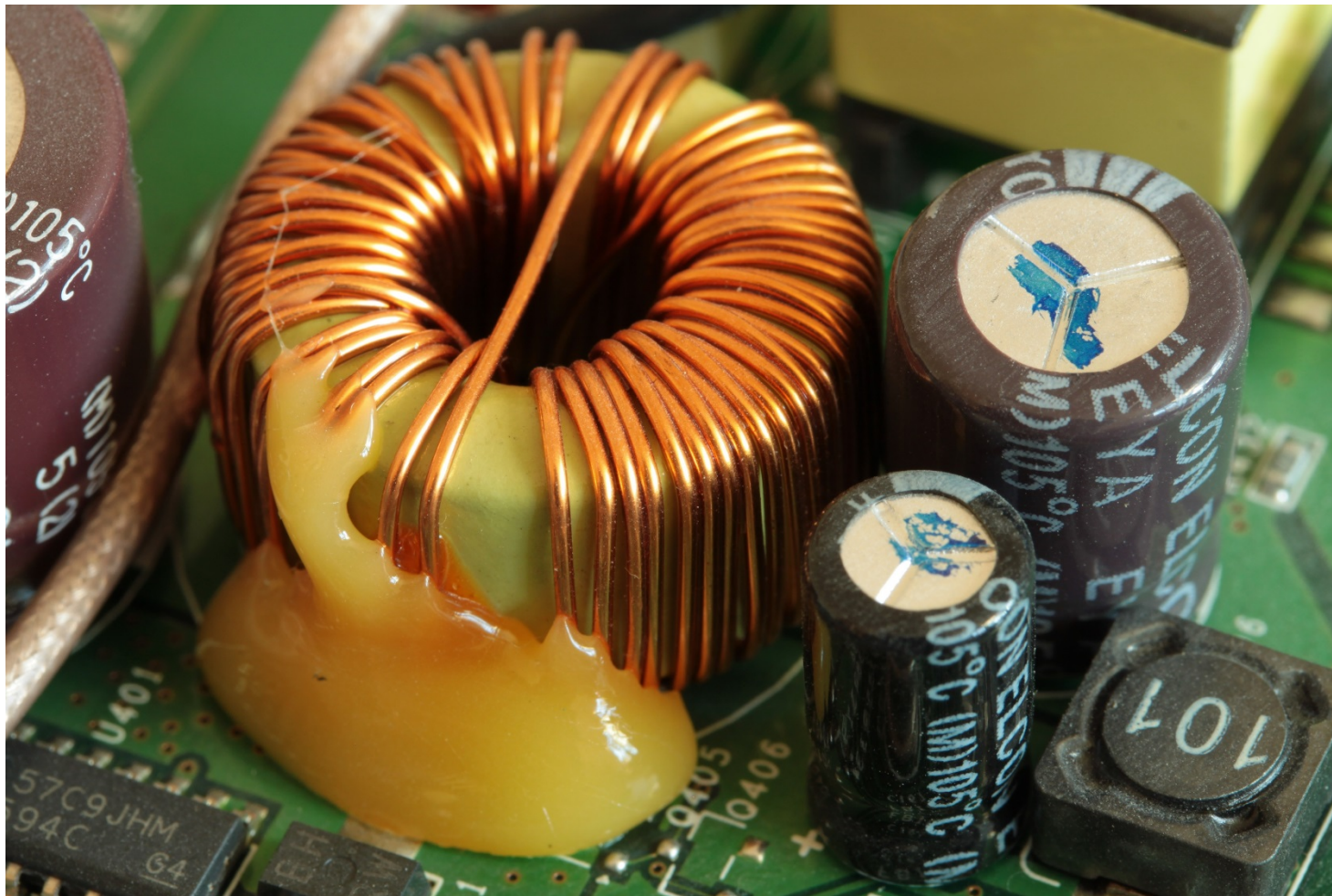


Fig. 7.10: Slick, [https://en.wikipedia.org/wiki/File:3Com OfficeConnect ADSL Wireless 11g Firewall Router 2012-10-28-0869.jpg](https://en.wikipedia.org/wiki/File:3Com_OfficeConnect_ADSL_Wireless_11g_Firewall_Router_2012-10-28-0869.jpg), public domain via CC0 1.0 (<https://creativecommons.org/publicdomain/zero/1.0/deed.en>).

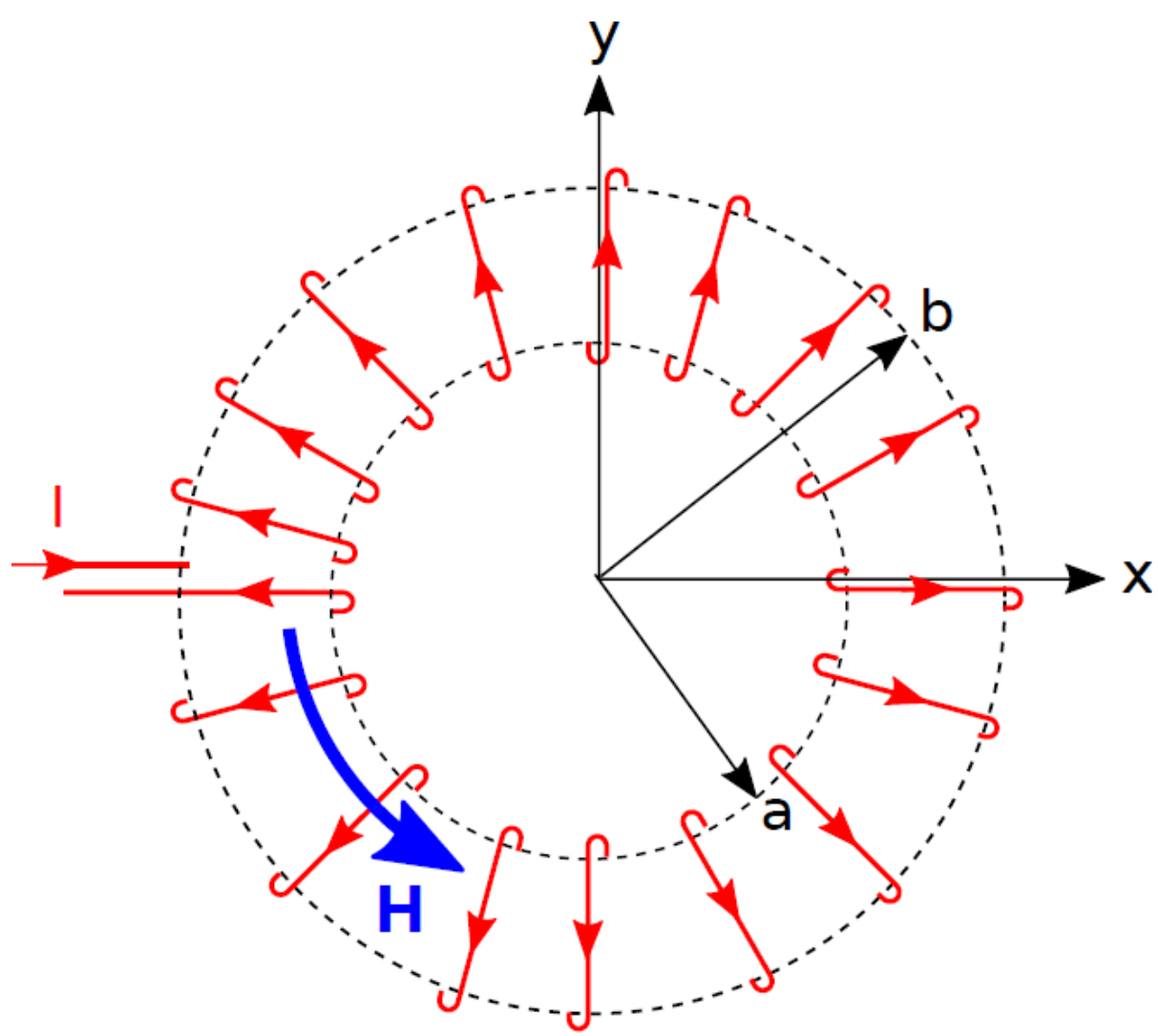


Fig. 7.11

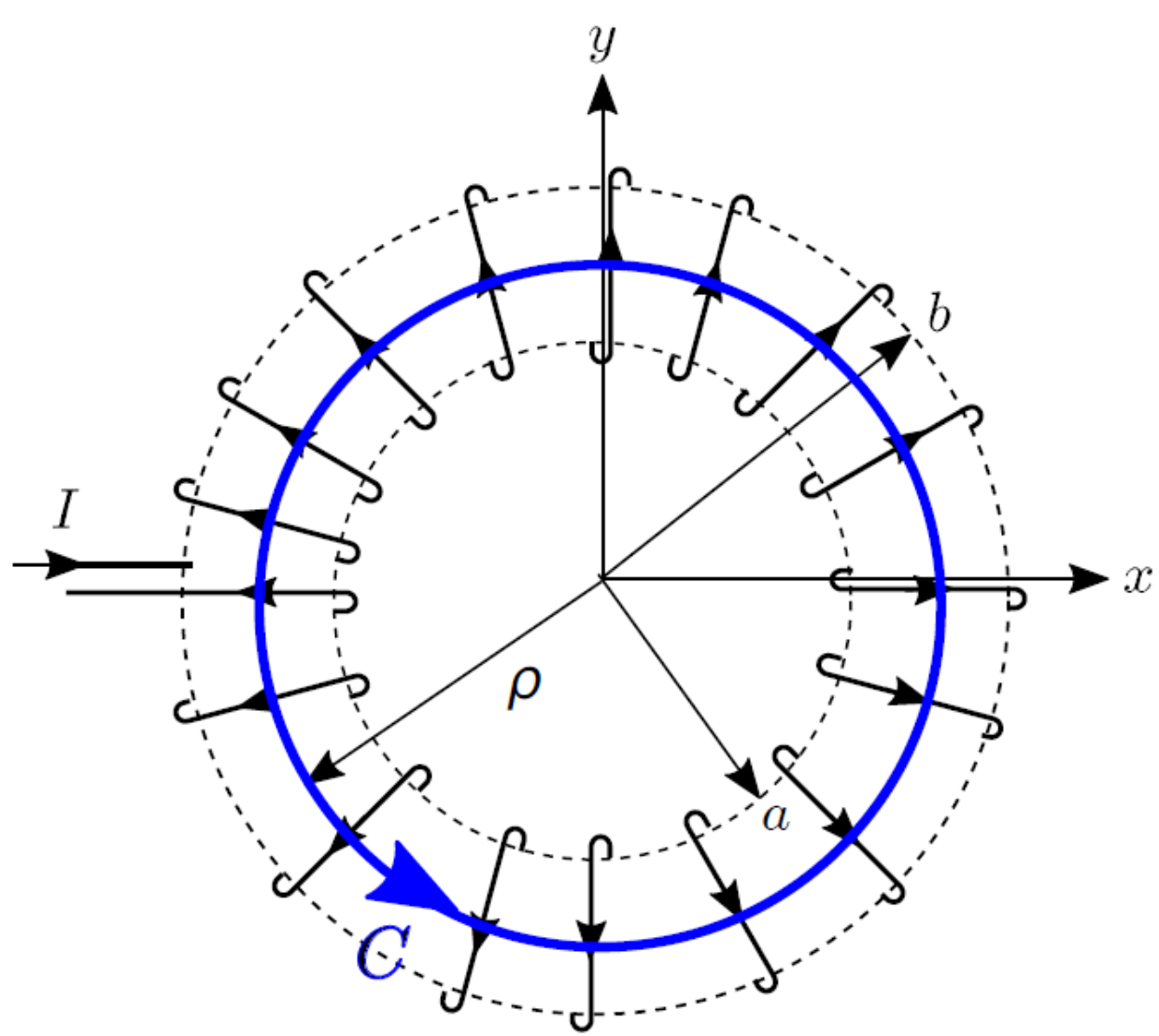


Fig. 7.12

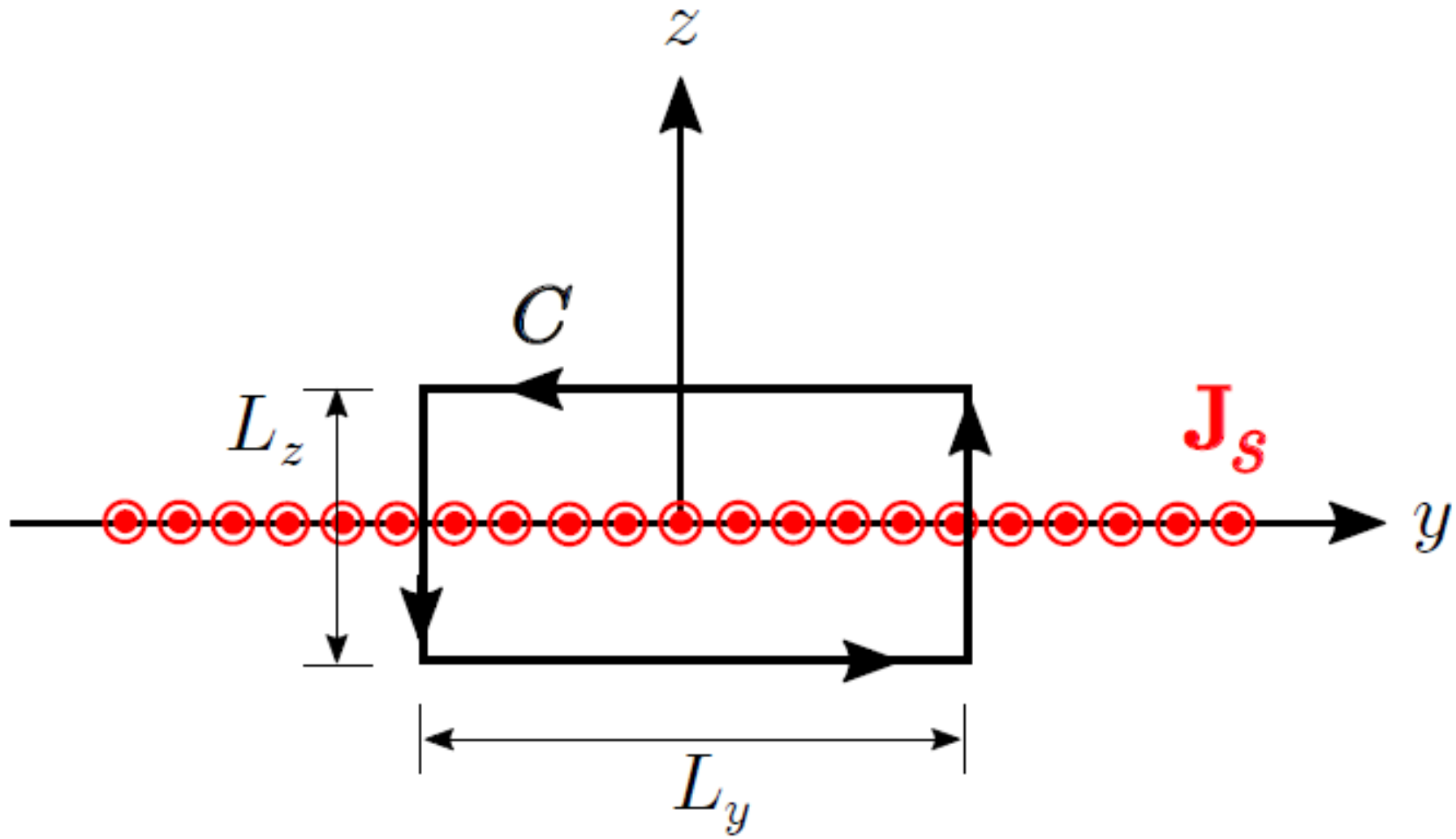


Fig. 7.13

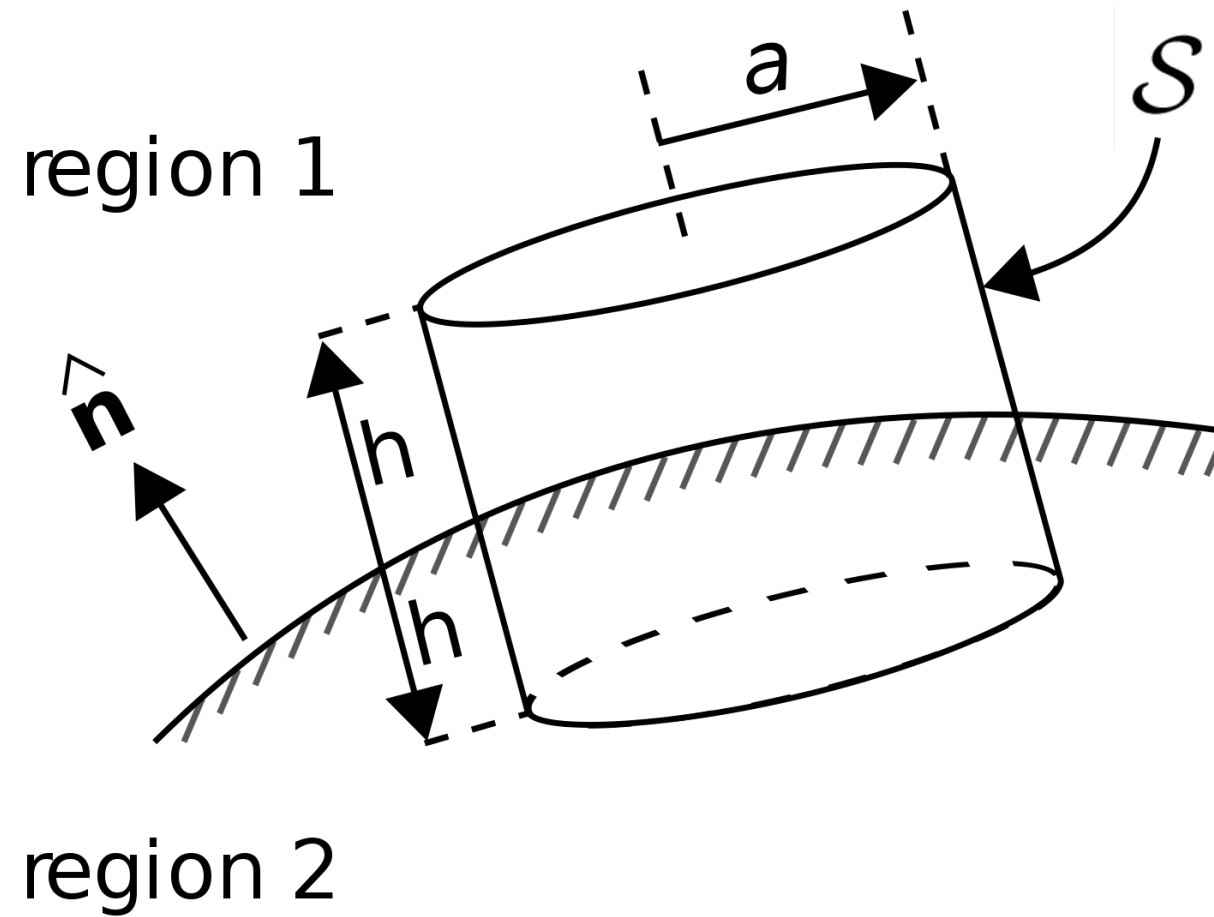


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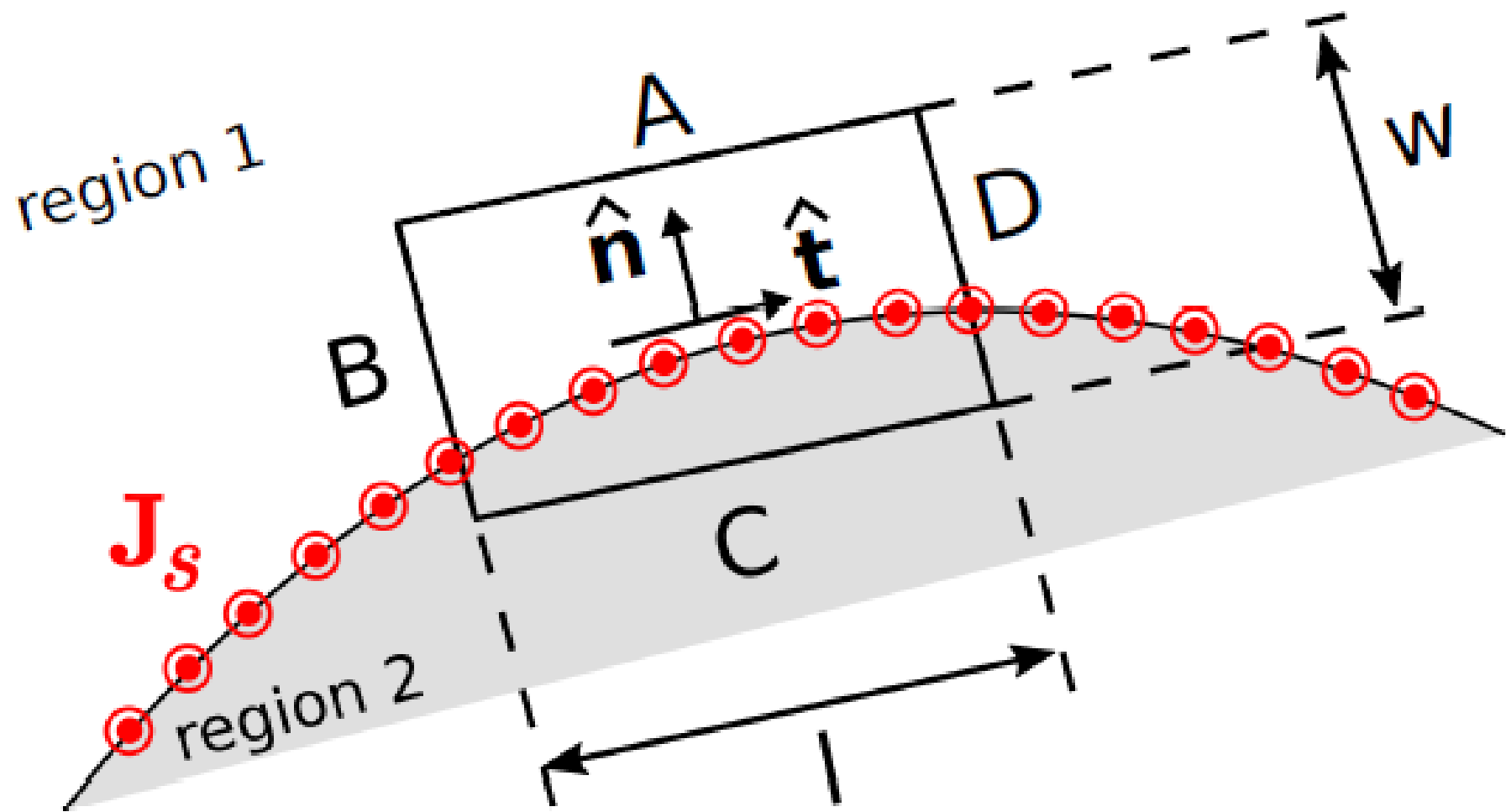


Fig. 7.15

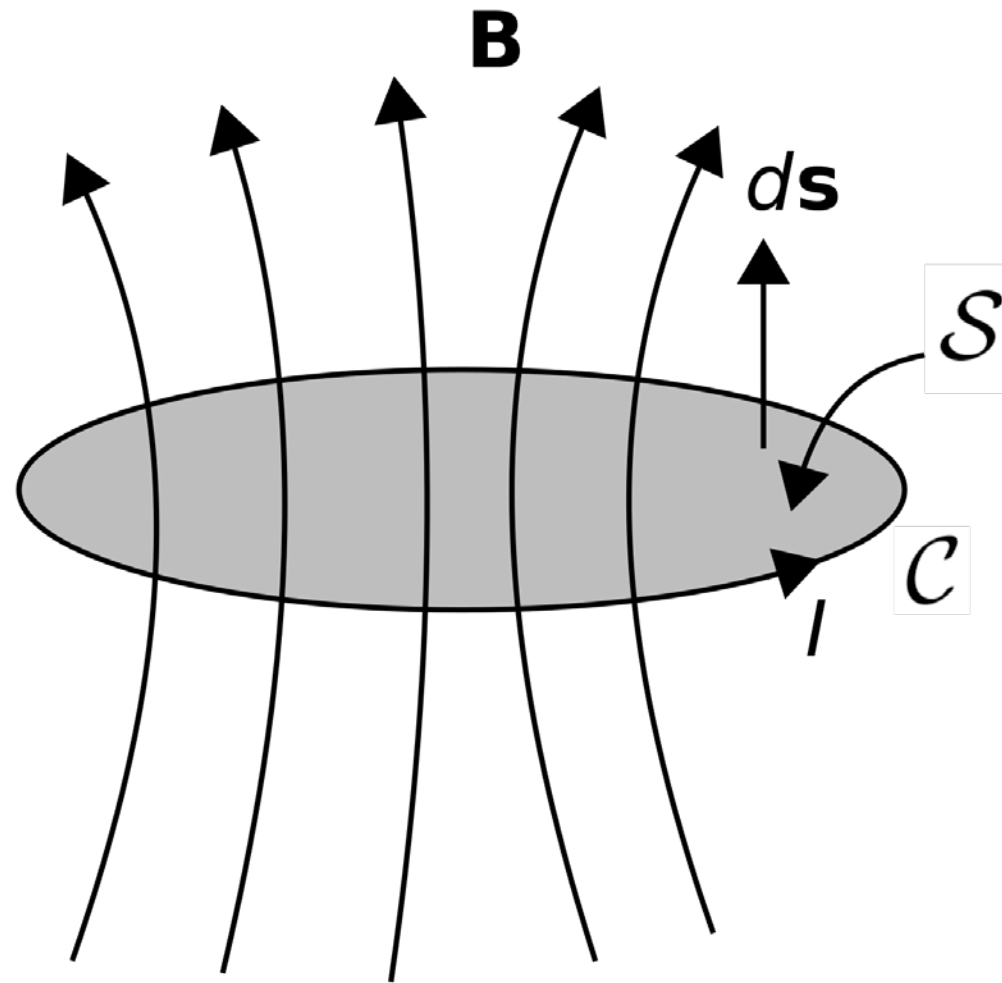


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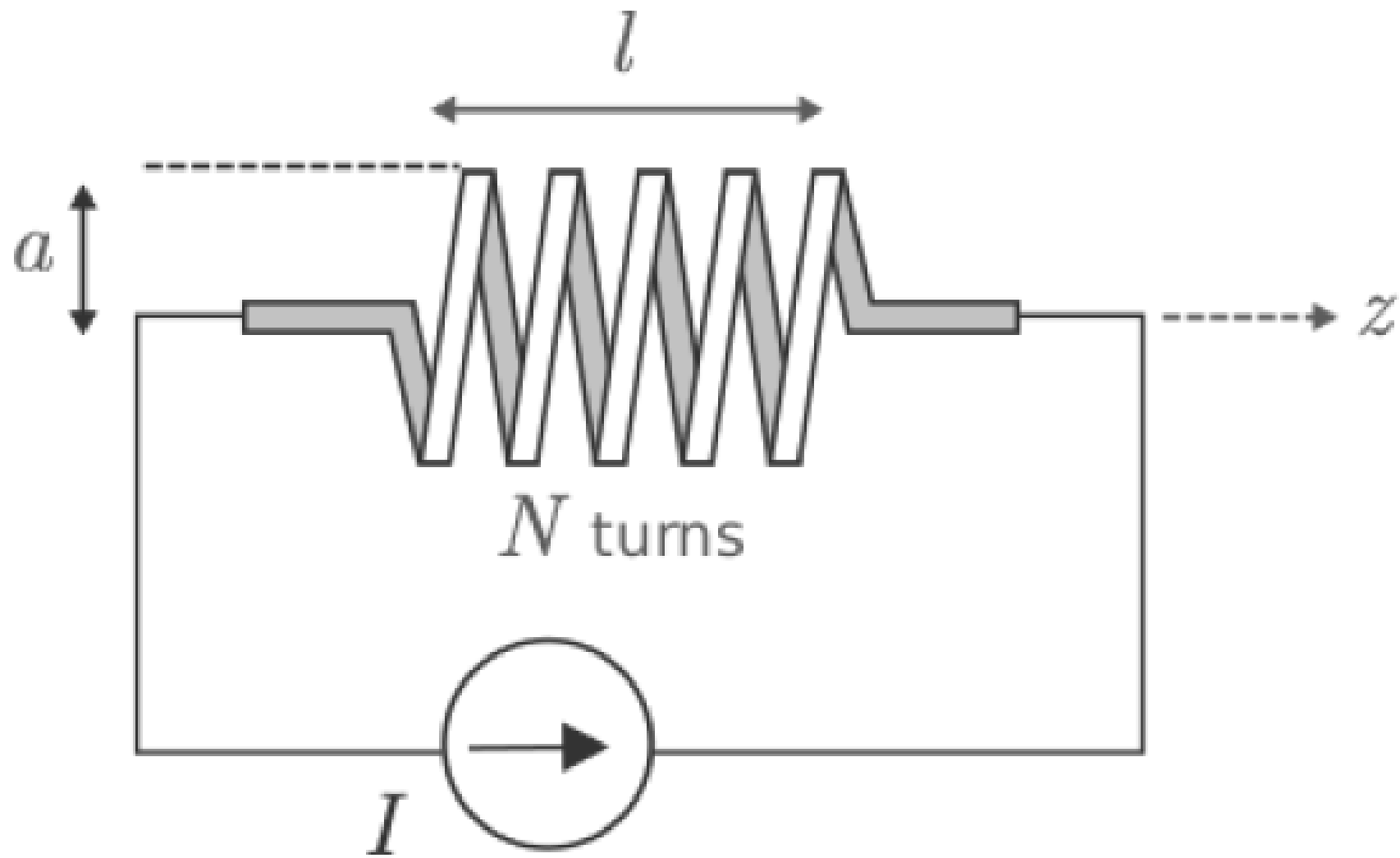


Fig. 7.17



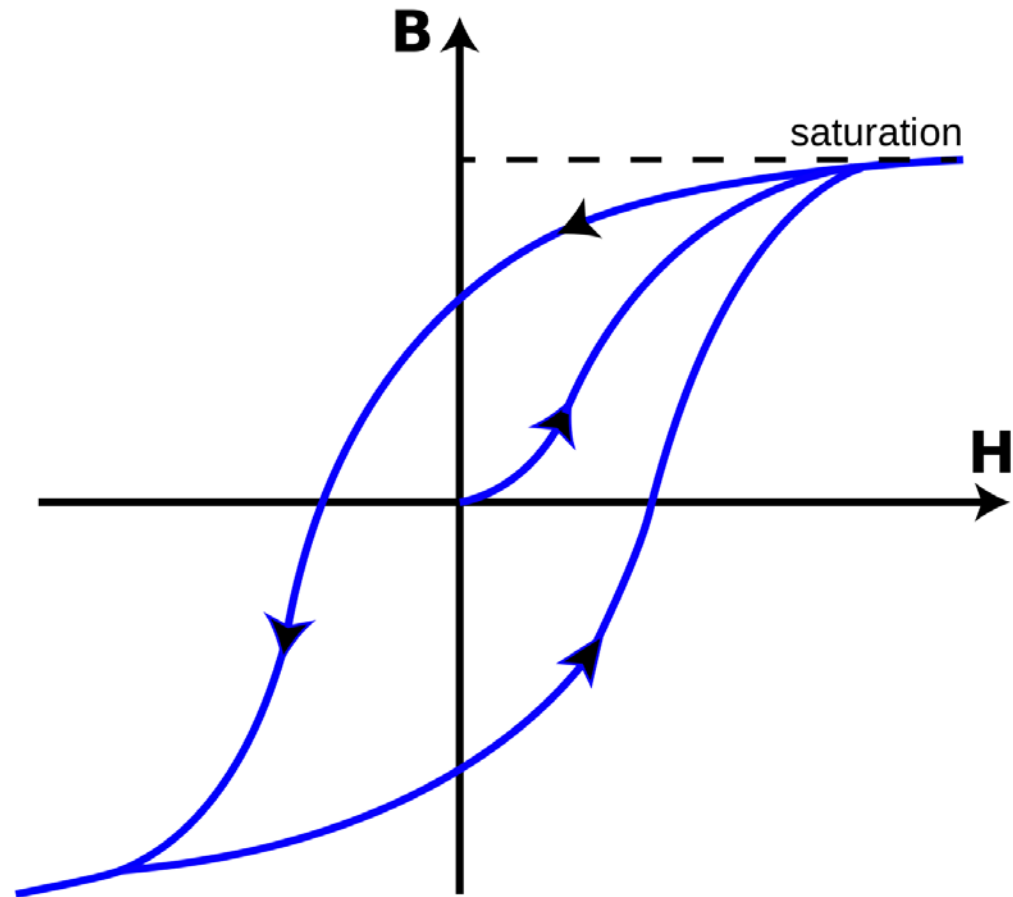


Fig. 7.19: © Ndthe, <https://commons.wikimedia.org/wiki/File:HysteresisSVG.svg>, CC BY SA 3.0 (<https://creativecommons.org/licenses/by-sa/3.0/deed.en>), modified by author.

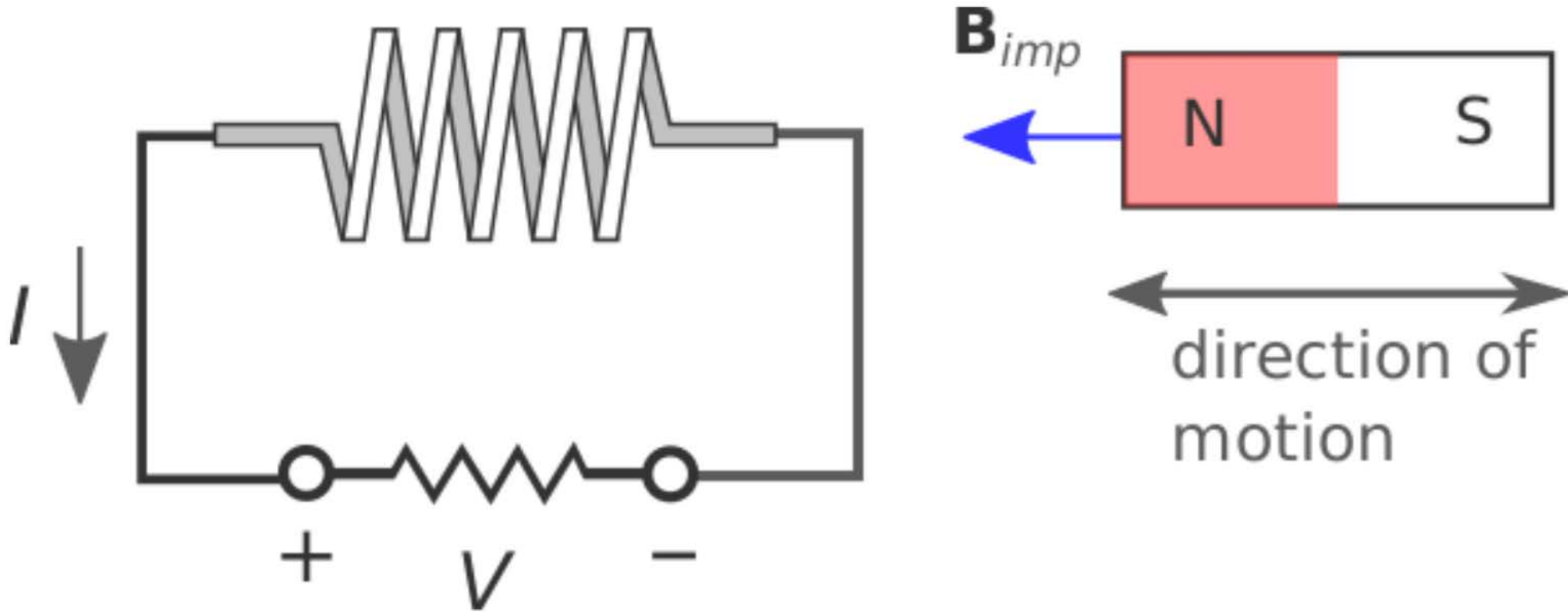


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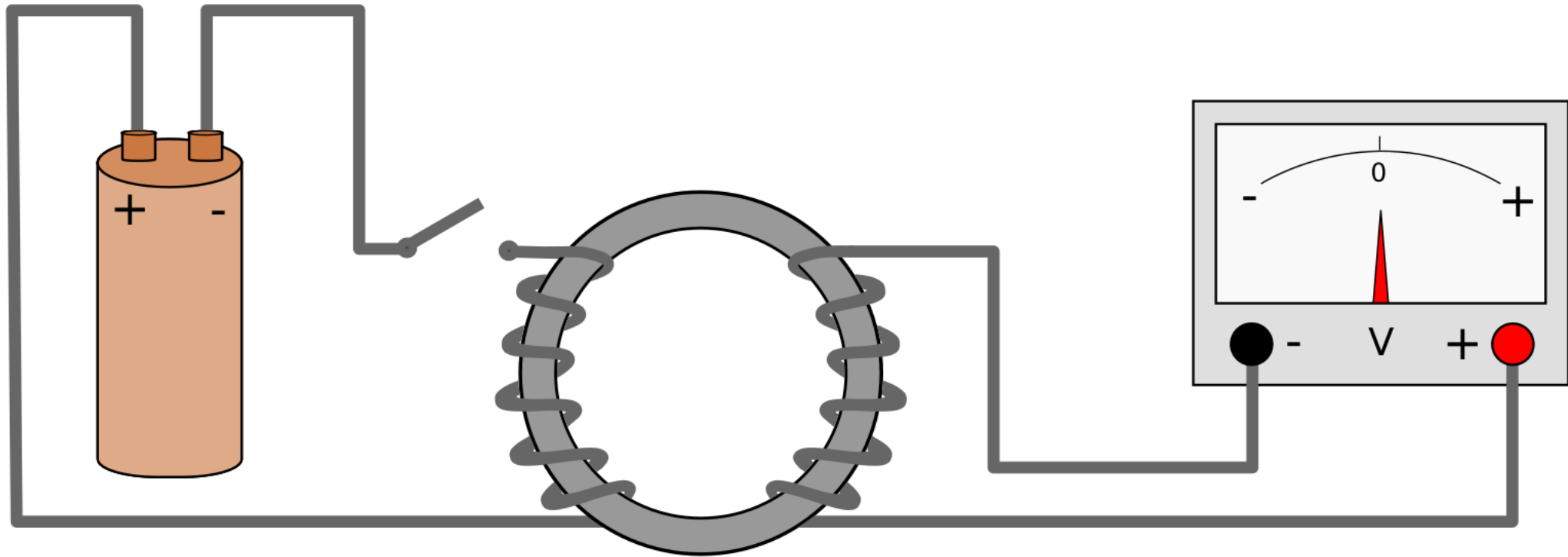


Fig. 8.2: E. Bach, [https://commons.wikimedia.org/wiki/File:Faraday emf experiment.svg](https://commons.wikimedia.org/wiki/File:Faraday_emf_experiment.svg), public domain via CC0 1.0 (<https://creativecommons.org/publicdomain/zero/1.0/deed.en>), modified from the original.

**B**

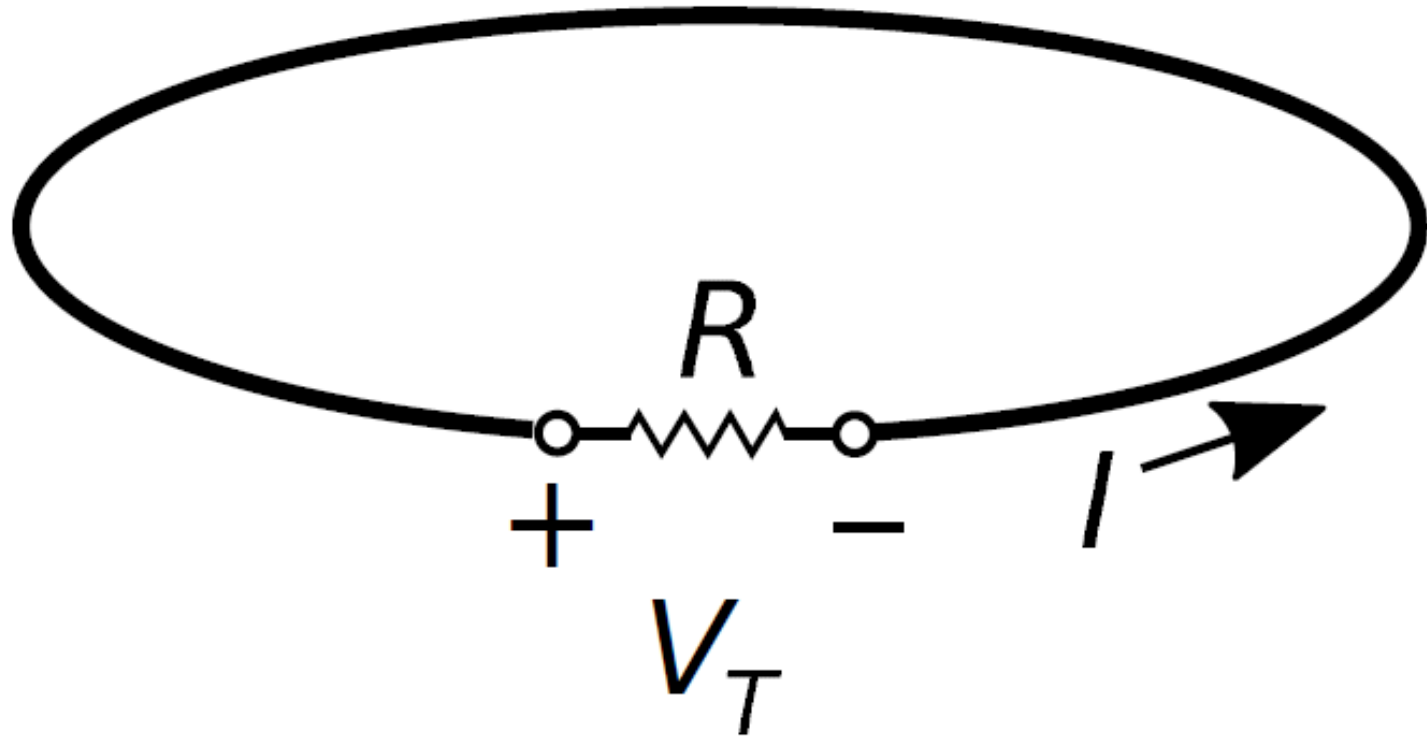


Fig. 8.3

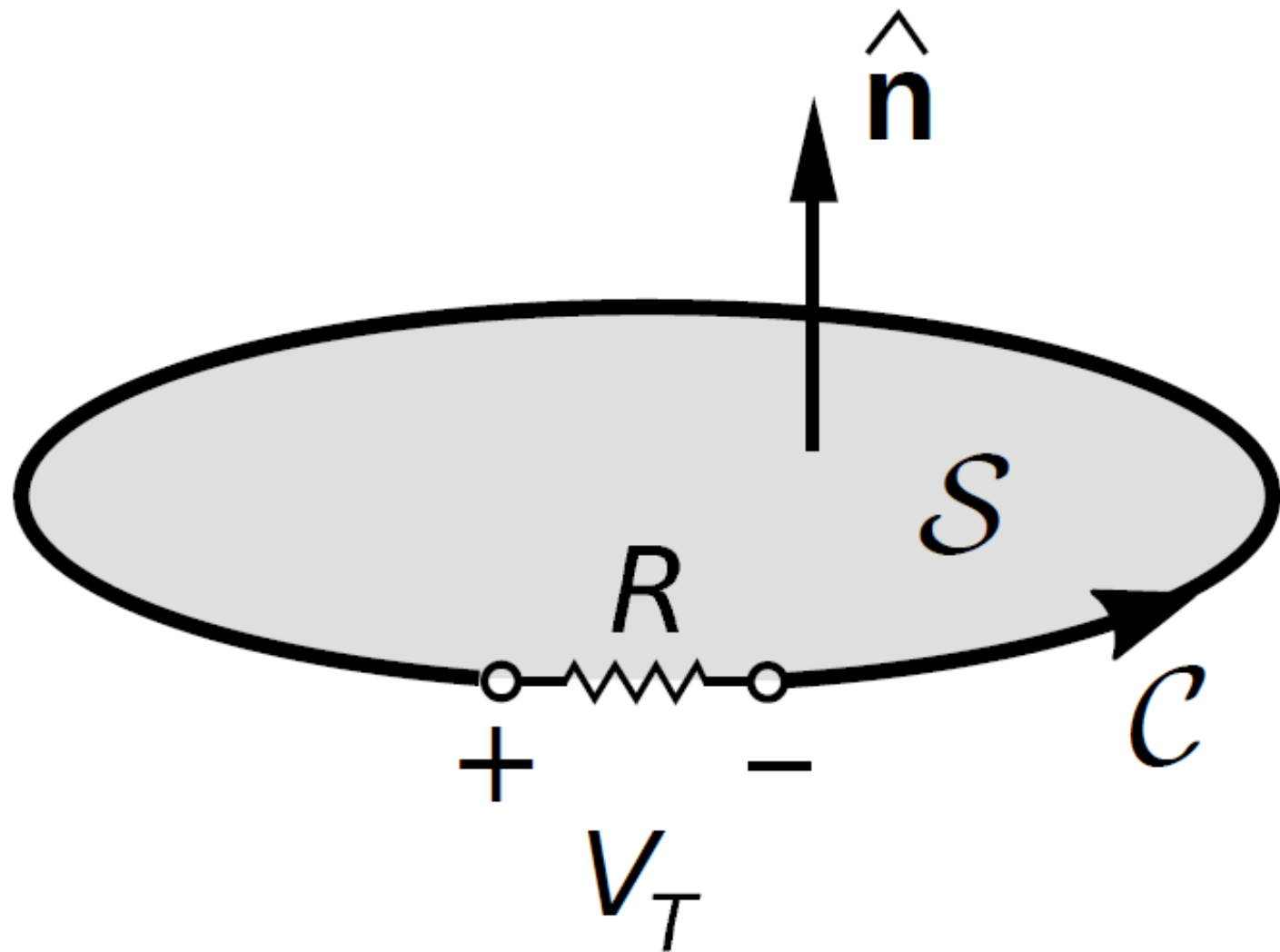


Fig. 8.4

**B**

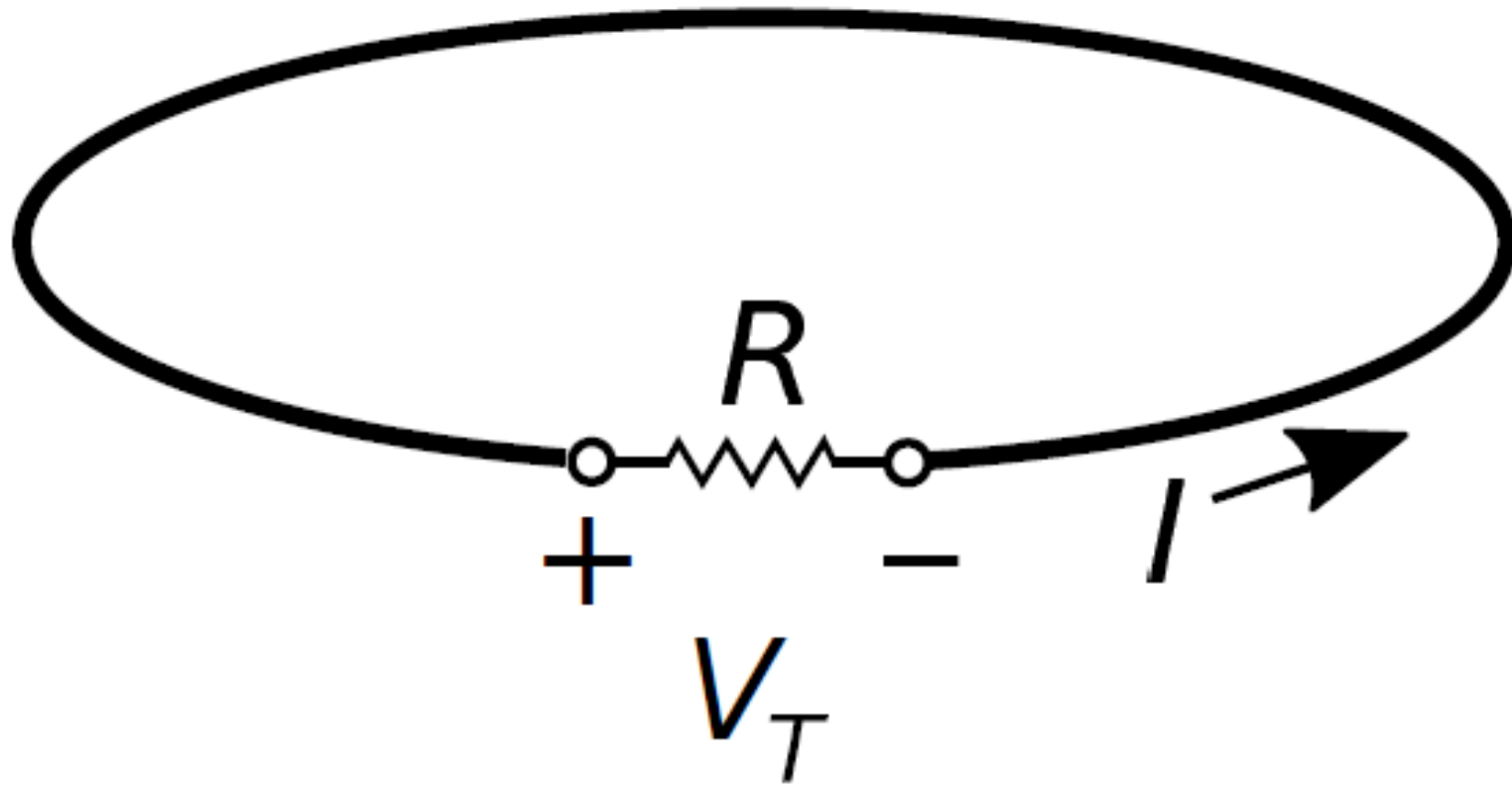


Fig. 8.5

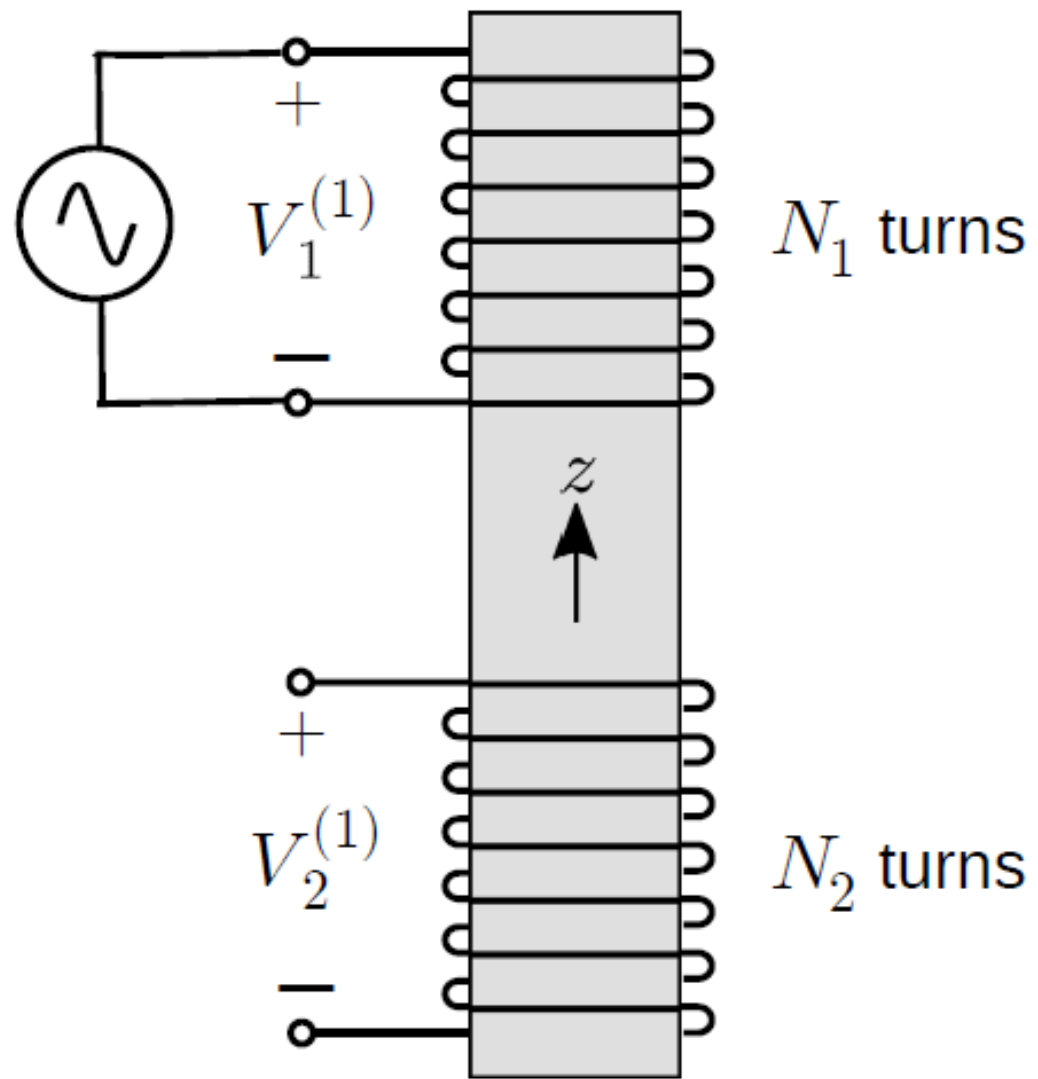


Fig. 8.6

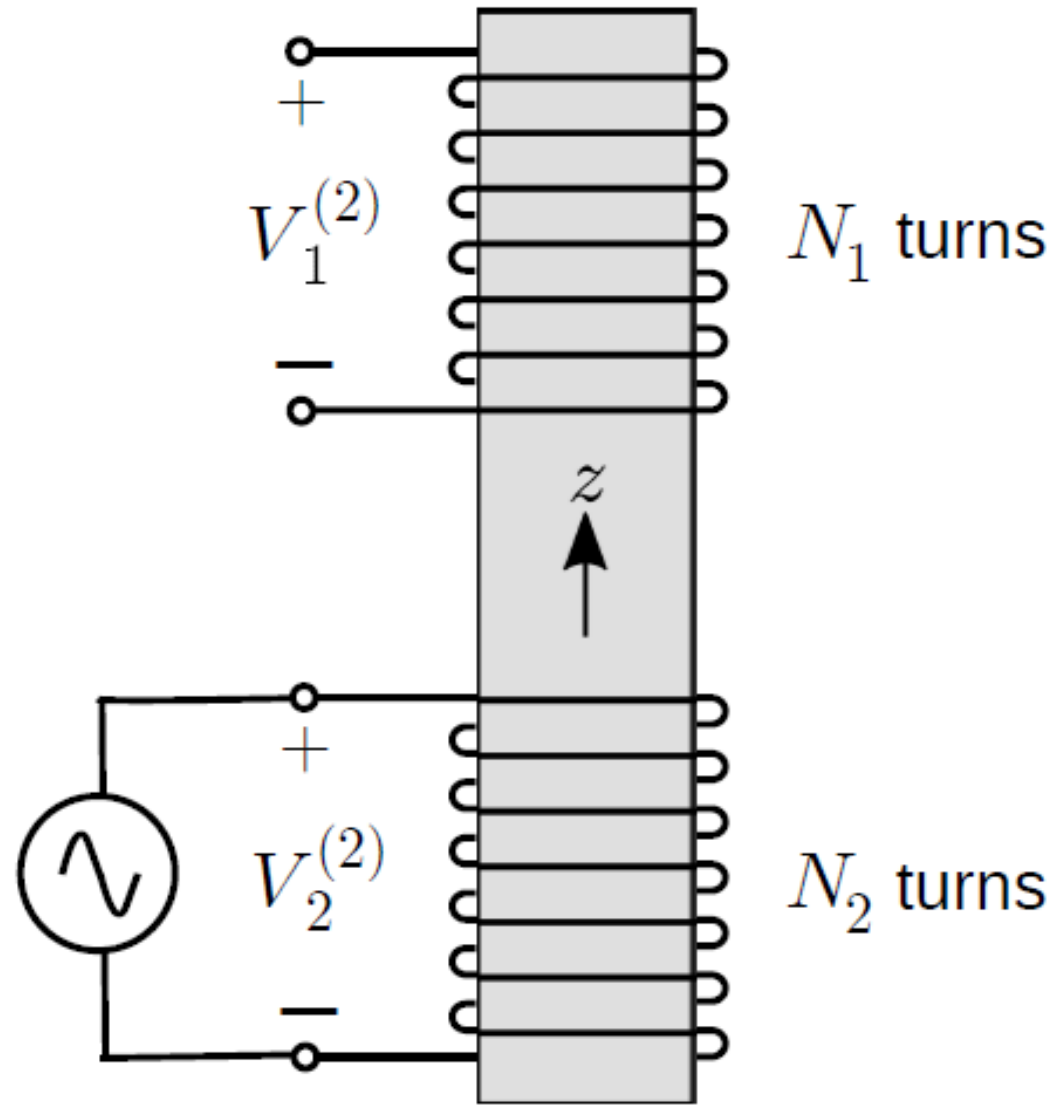


Fig. 8.7

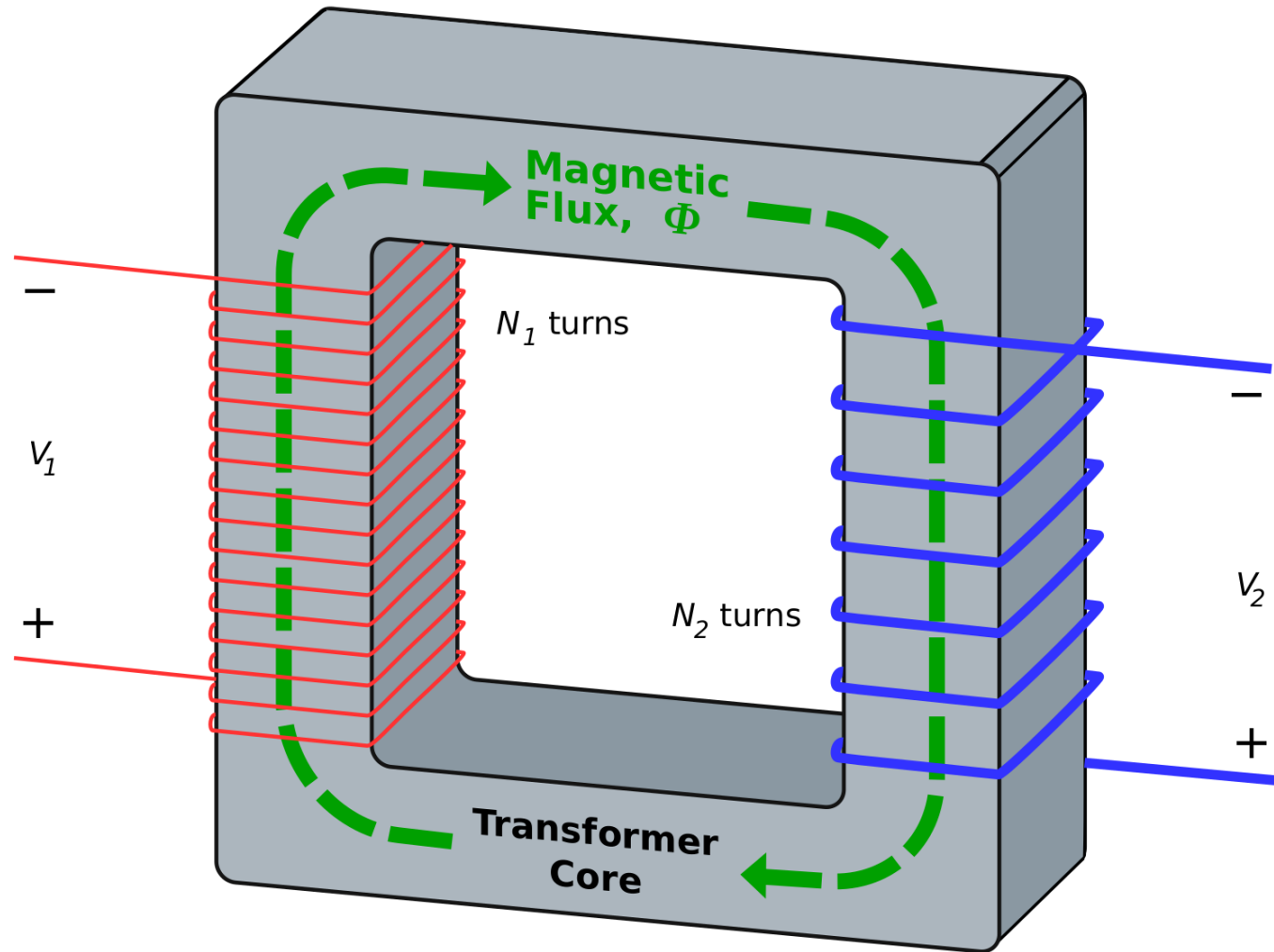


Fig. 8.8: © BillC, [https://commons.wikimedia.org/wiki/File:Transformer3d\\_col3.svg](https://commons.wikimedia.org/wiki/File:Transformer3d_col3.svg), CC BY SA 3.0 (<https://creativecommons.org/licenses/by-sa/3.0/>). Modified by author.

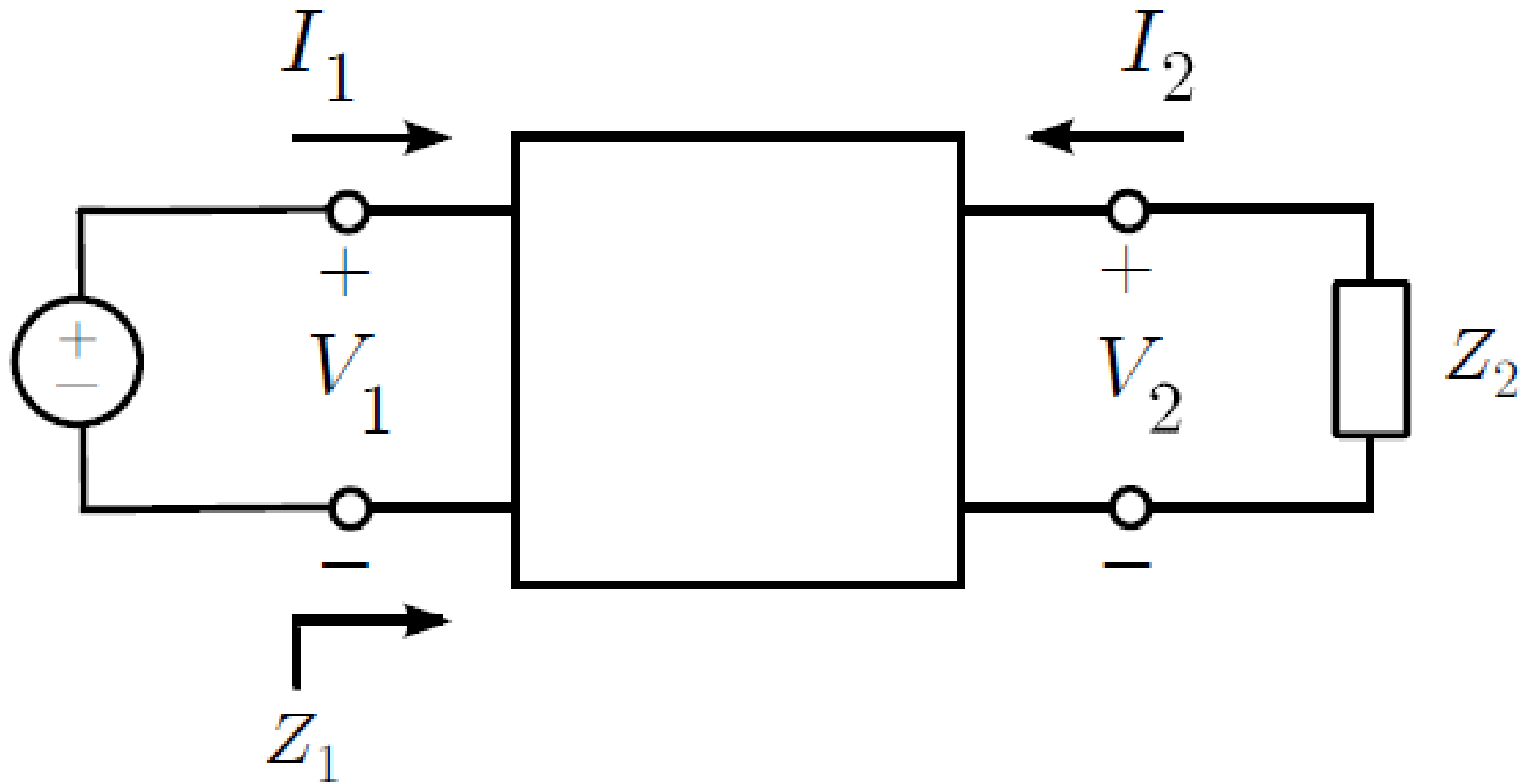


Fig. 8.9

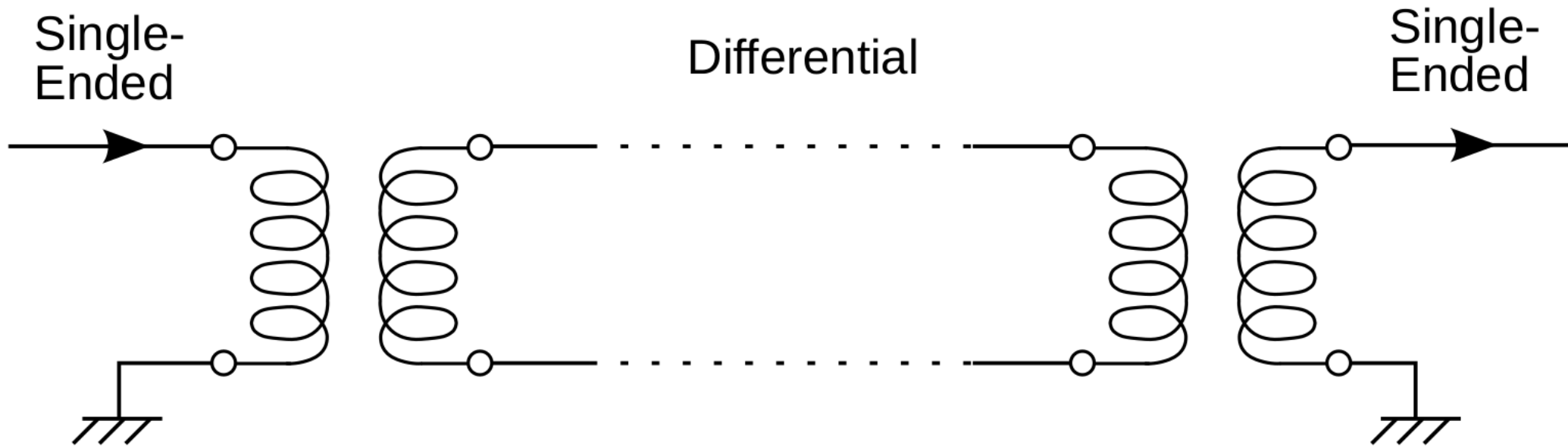


Fig. 8.10: © SpinningSpark, [https://en.wikipedia.org/wiki/File:Transformer\\_balance.svg](https://en.wikipedia.org/wiki/File:Transformer_balance.svg), CC BY SA 3.0 (<https://creativecommons.org/licenses/by-sa/3.0/>). Modified by author.

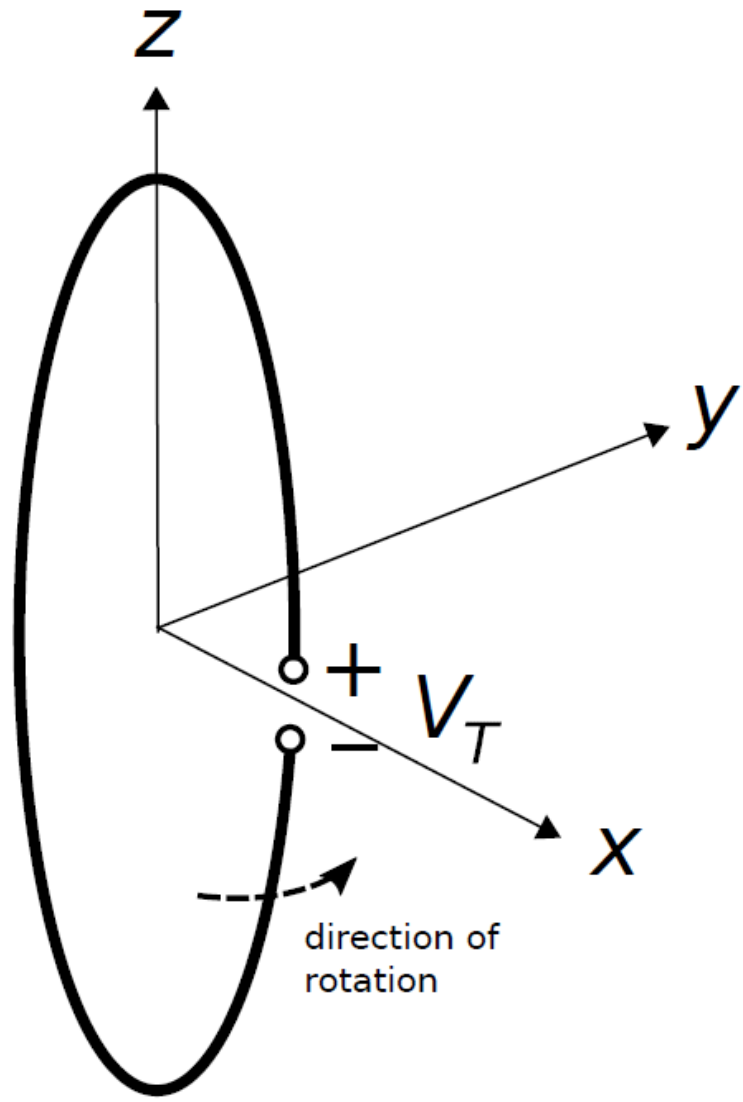


Fig. 8.11

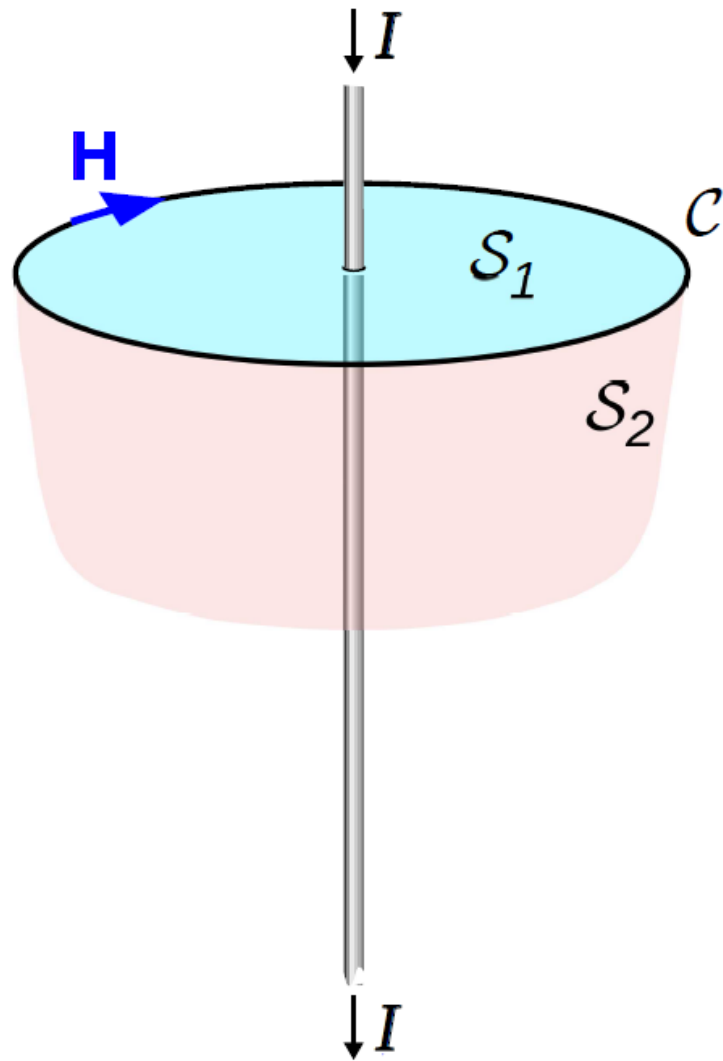


Fig. 8.12: C. Burks, [https://en.wikipedia.org/wiki/File:Displacement\\_current\\_in\\_capacitor.svg](https://en.wikipedia.org/wiki/File:Displacement_current_in_capacitor.svg), public domain. Heavily modified by author.

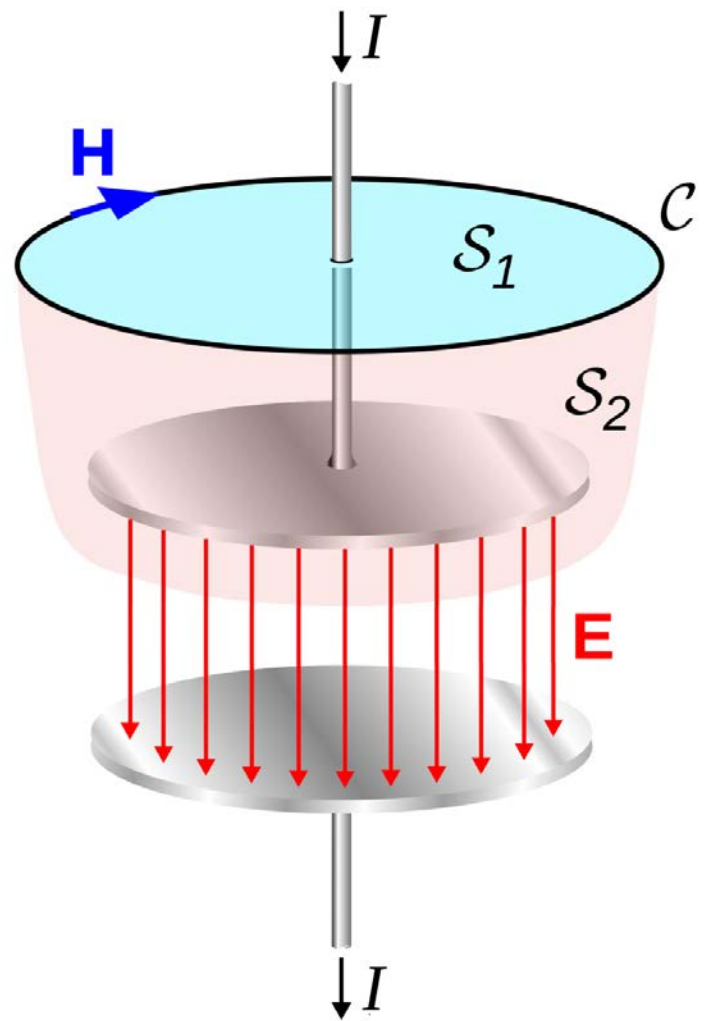


Fig. 8.13: C. Burks, [https://en.wikipedia.org/wiki/File:Displacement\\_current\\_in\\_capacitor.svg](https://en.wikipedia.org/wiki/File:Displacement_current_in_capacitor.svg), public domain. Heavily modified by author.

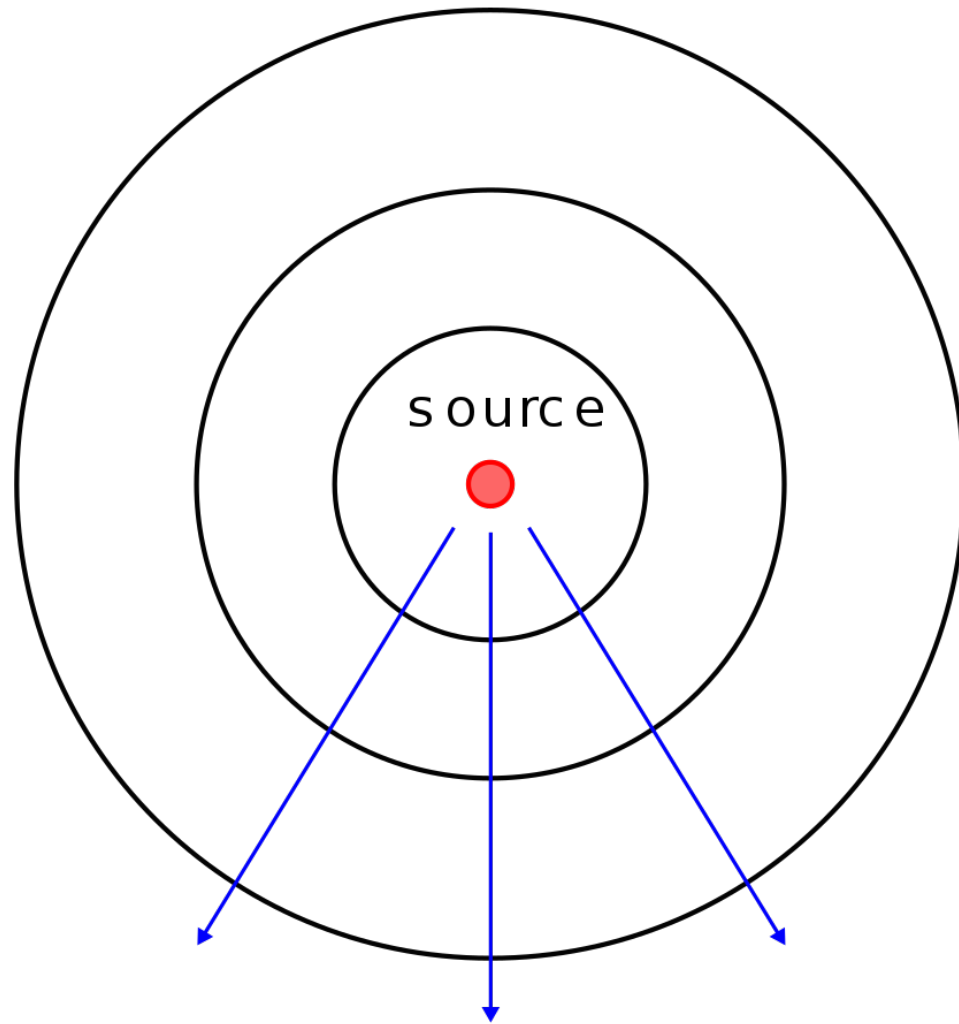


Fig. 9.1: © Y. Qin, [https://commons.wikimedia.org/wiki/File:M0142\\_fSphericalPhasefront.svg](https://commons.wikimedia.org/wiki/File:M0142_fSphericalPhasefront.svg), CC BY 4.0 (<https://creativecommons.org/licenses/by/4.0/>).

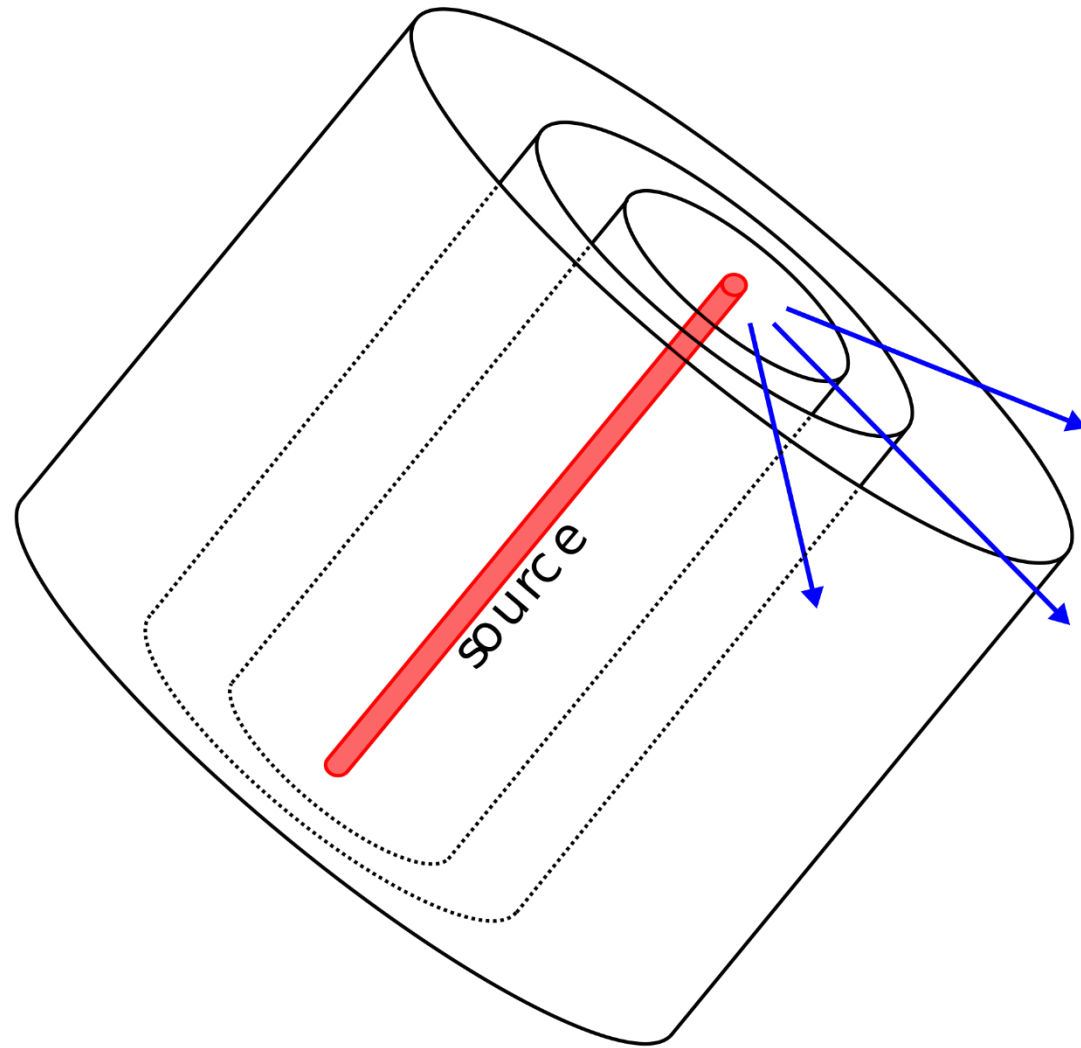


Fig. 9.2: © Y. Qin, [https://commons.wikimedia.org/wiki/File:M0142\\_fCylindricalPhasefront.svg](https://commons.wikimedia.org/wiki/File:M0142_fCylindricalPhasefront.svg),  
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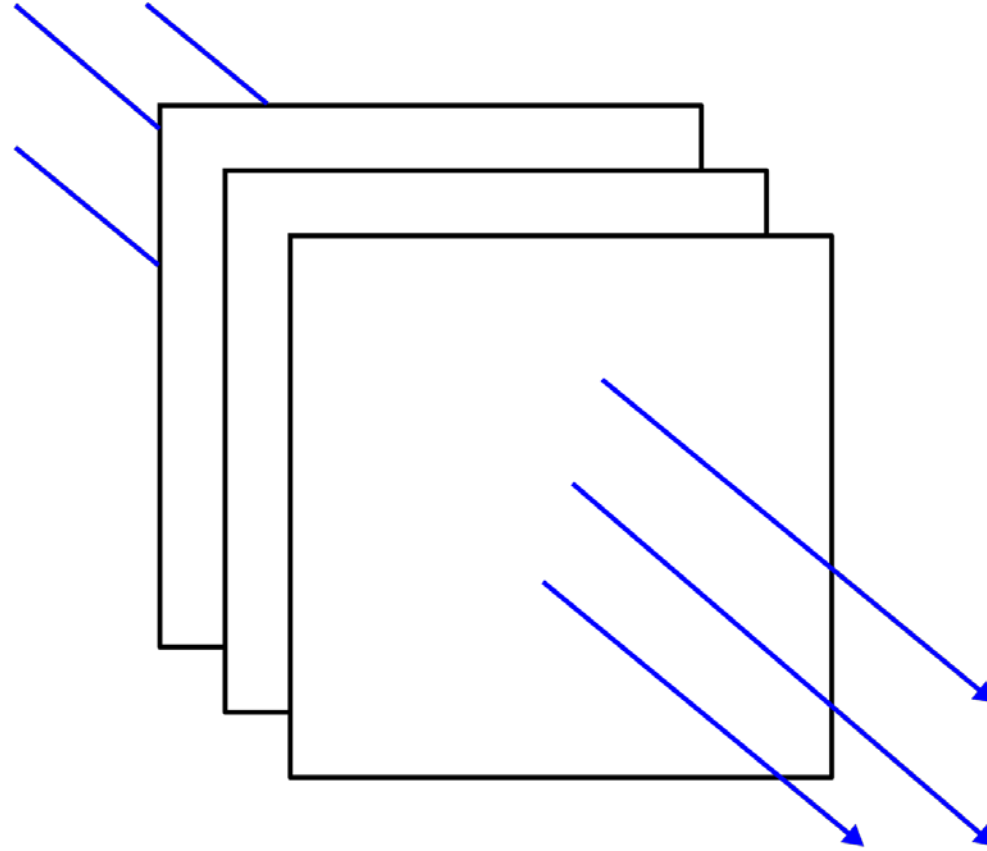


Fig. 9.3: © Y. Qin, [https://commons.wikimedia.org/wiki/File:M0142\\_fPlanarPhasefront.svg](https://commons.wikimedia.org/wiki/File:M0142_fPlanarPhasefront.svg), CC BY 4.0 (<https://creativecommons.org/licenses/by/4.0/>).

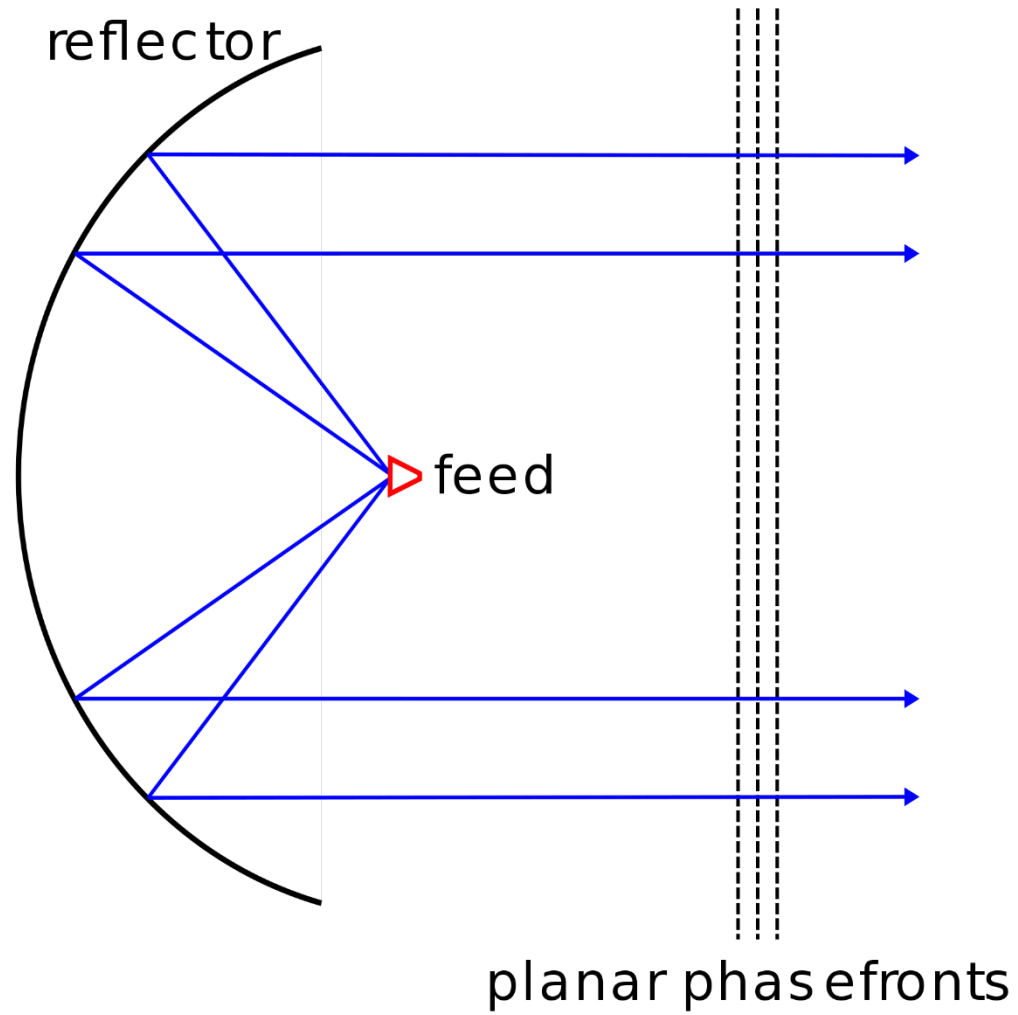


Fig. 9.4: © Y. Qin, [https://commons.wikimedia.org/wiki/File:M0142\\_fPlaneWavesReflector.svg](https://commons.wikimedia.org/wiki/File:M0142_fPlaneWavesReflector.svg), CC BY 4.0 (<https://creativecommons.org/licenses/by/4.0/>).

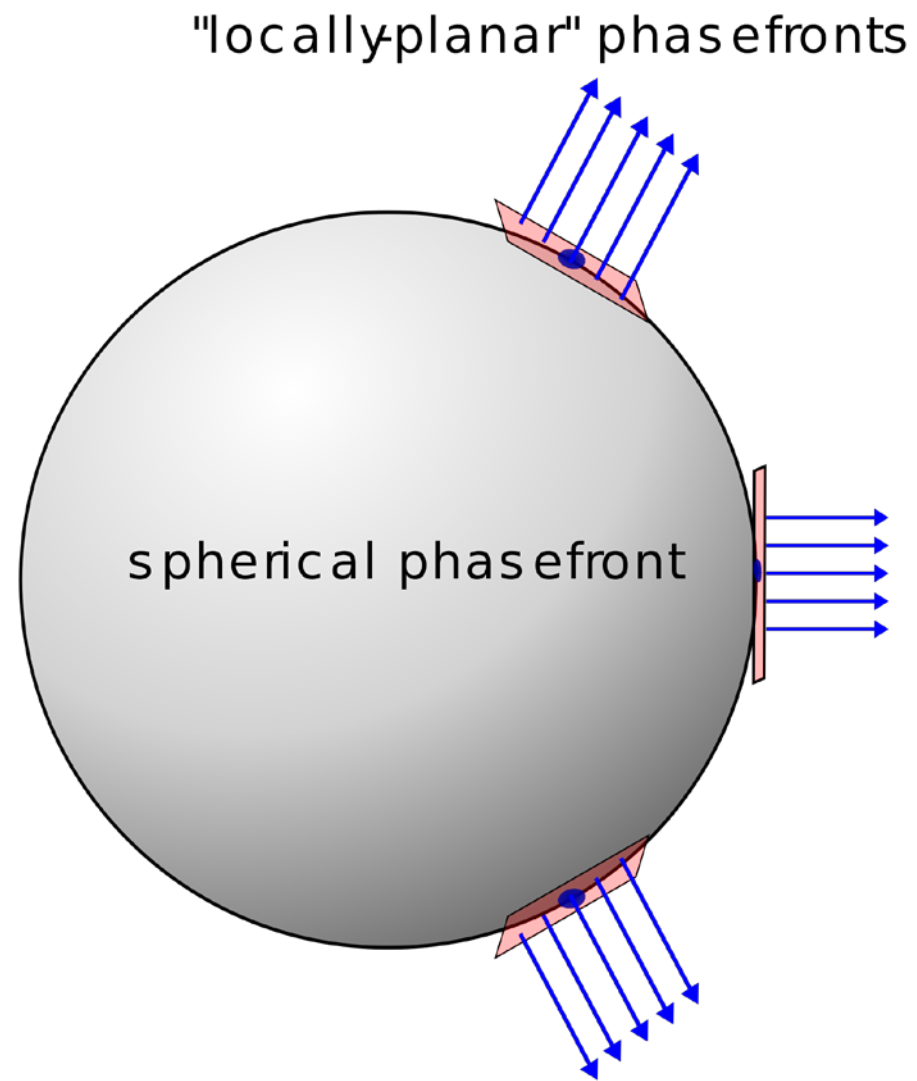


Fig. 9.5: © Y. Qin, [https://commons.wikimedia.org/wiki/File:M0142\\_fLocallyPlanar.svg](https://commons.wikimedia.org/wiki/File:M0142_fLocallyPlanar.svg), CC BY 4.0 (<https://creativecommons.org/licenses/by/4.0/>).

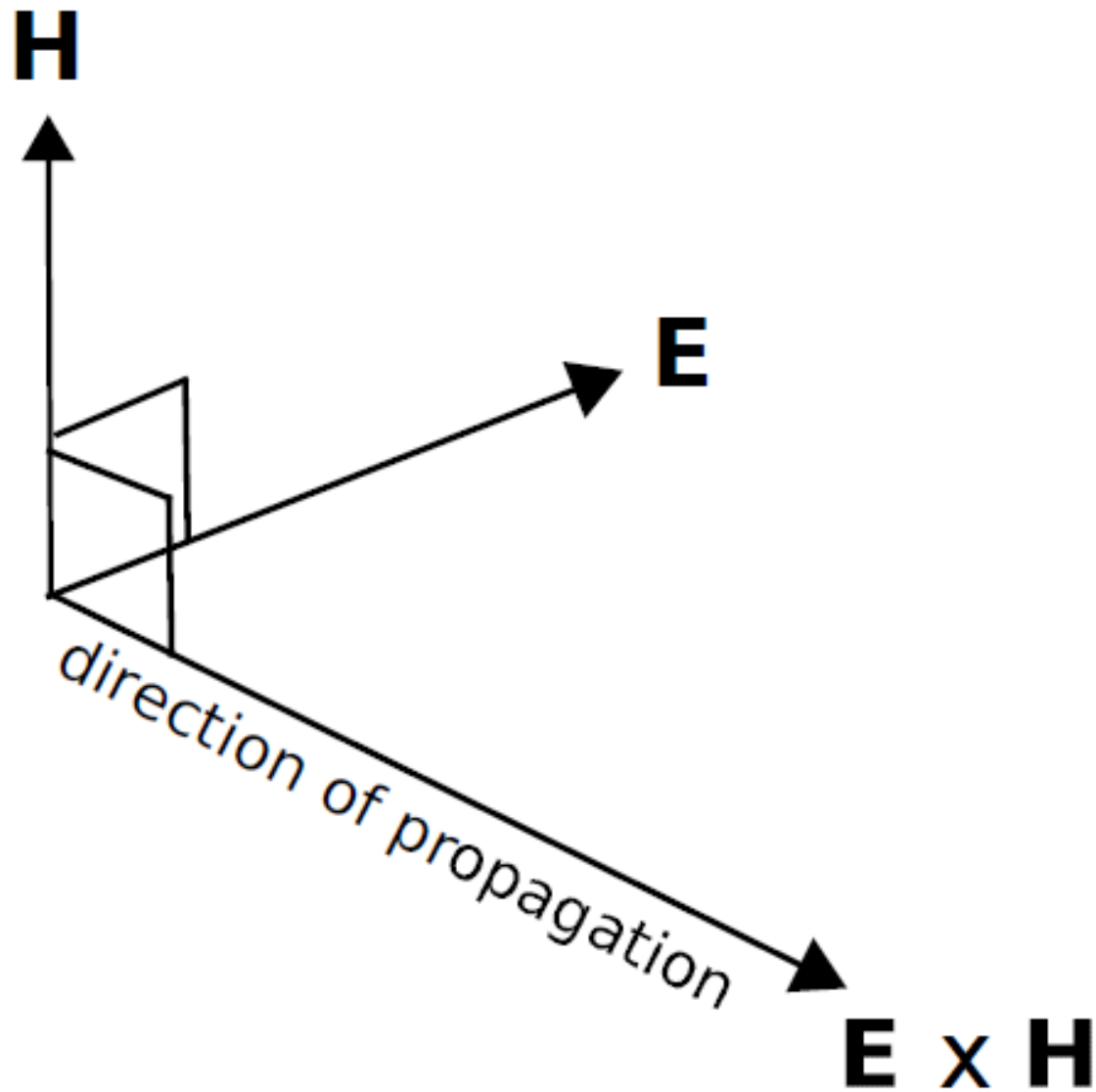


Fig. 9.6

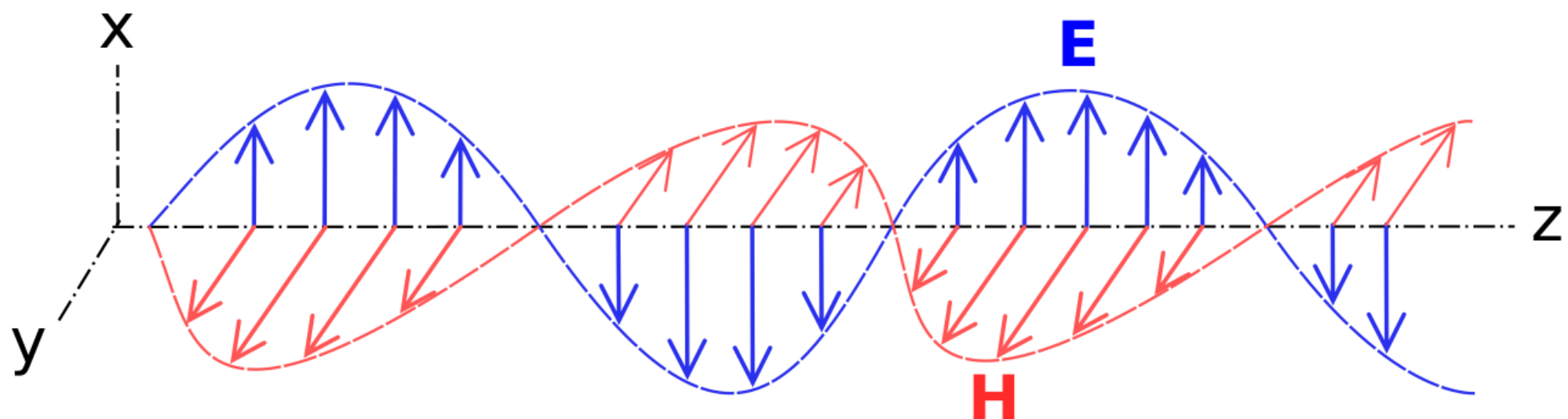


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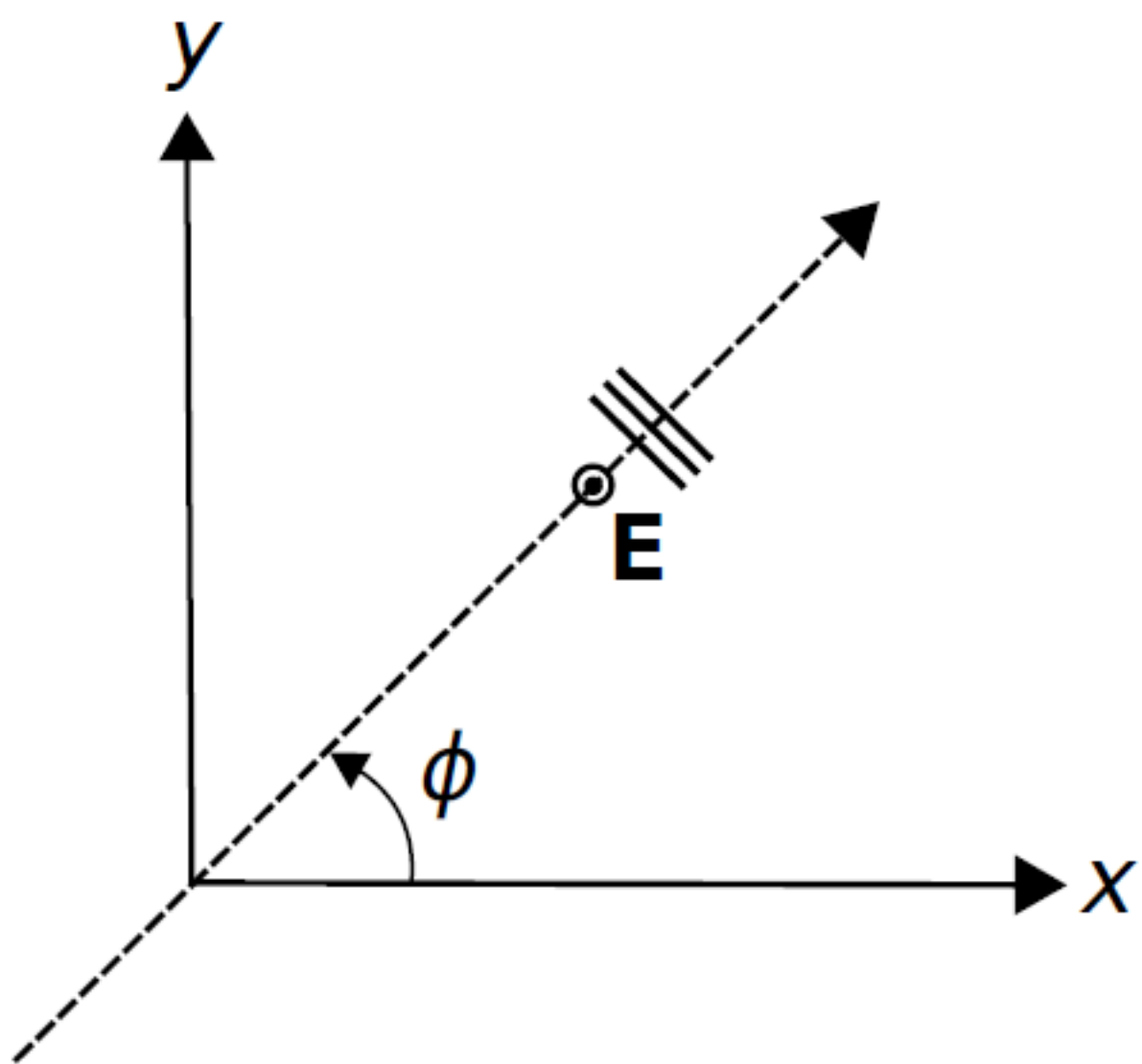


Fig. 9.8

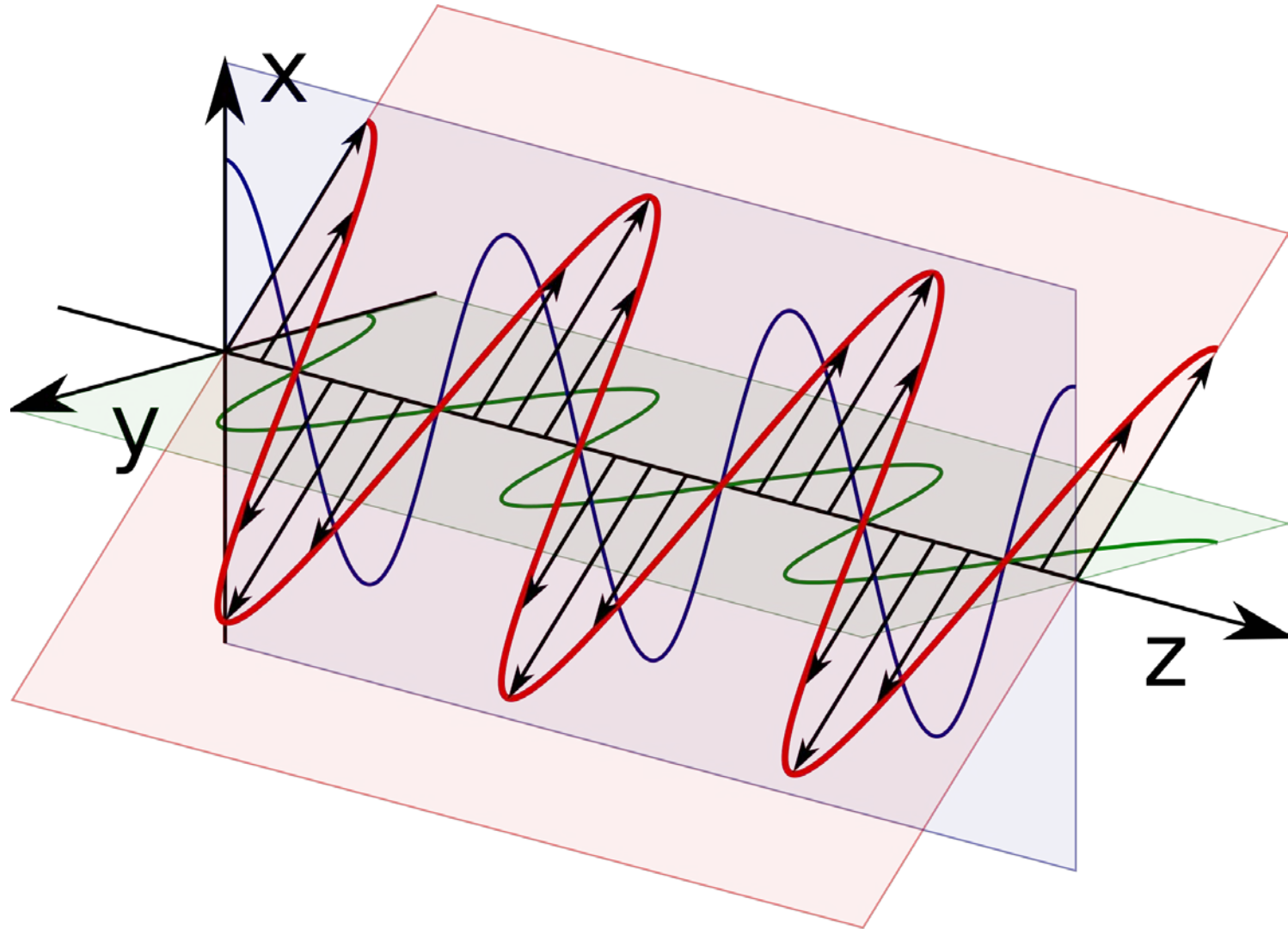


Fig. 9.9: RJB1, [https://commons.wikimedia.org/wiki/File:Linearly Polarized Wave.svg](https://commons.wikimedia.org/wiki/File:Linearly_Polarized_Wave.svg), public domain. Modified by author.

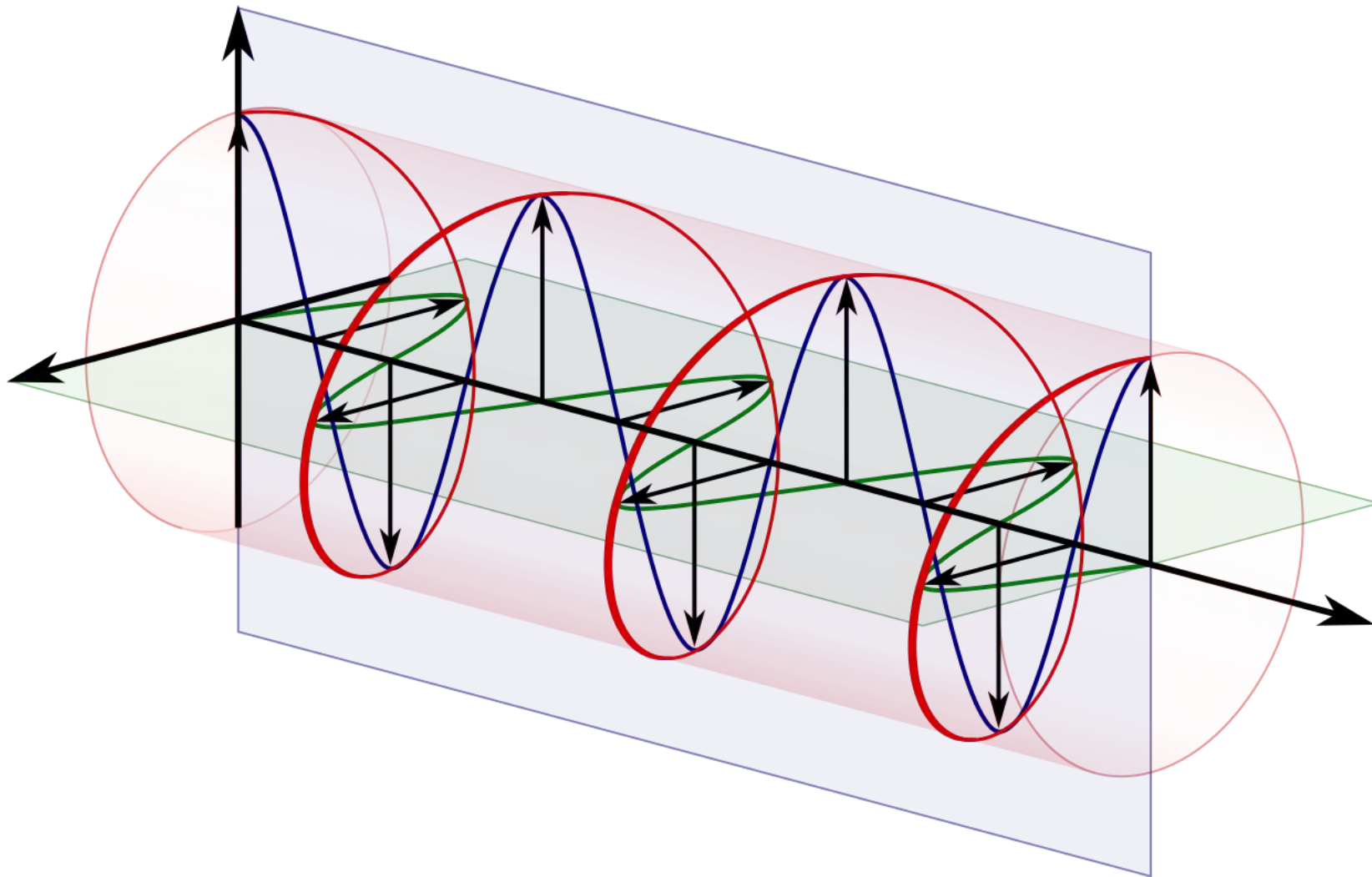


Fig. 9.10: Dave3457, <https://en.wikipedia.org/wiki/File:Circular.Polarization.Circularly.Polarized.Light.With.Components.Left.Handed.svg>, public domain.

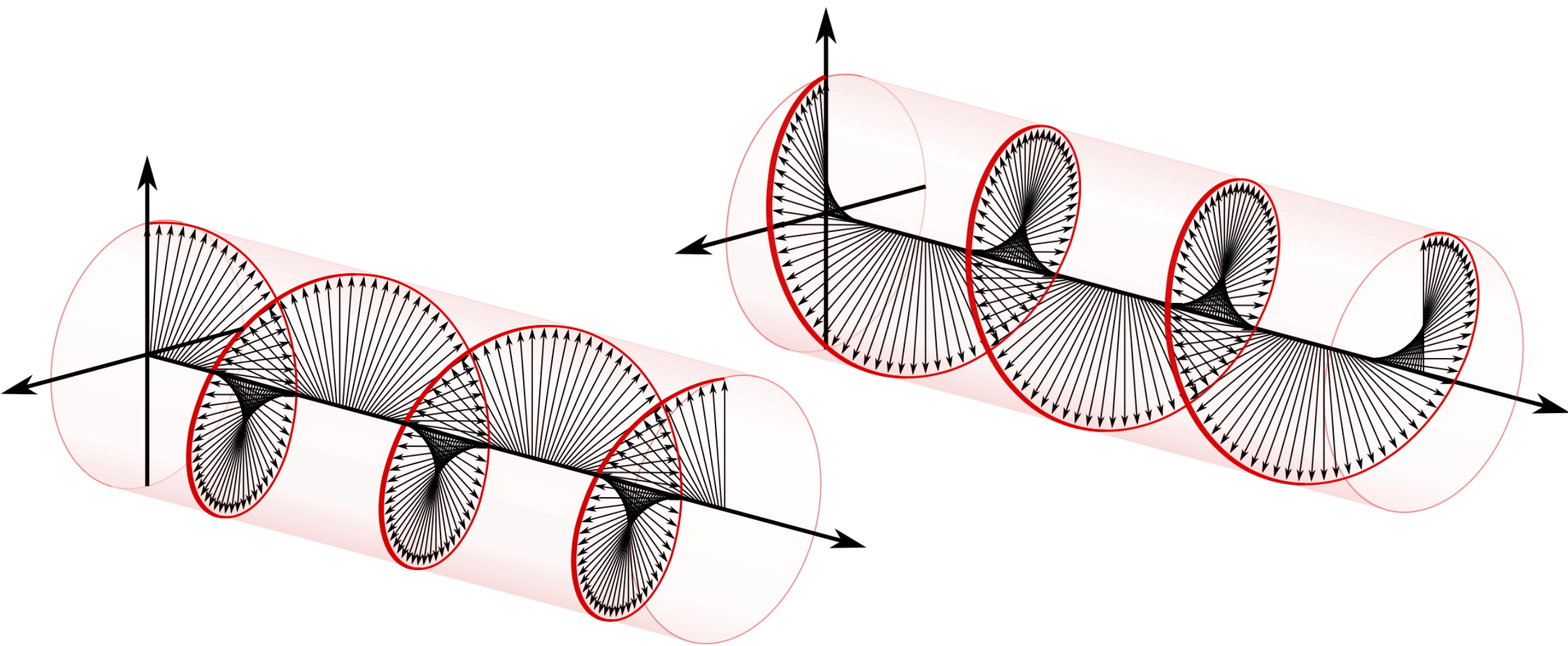


Fig. 9.11: Dave3457, <https://en.wikipedia.org/wiki/File:Circular.Polarization.Circularly.Polarized.Light.Without.Components.Left.Handed.svg> and <https://en.wikipedia.org/wiki/File:Circular.Polarization.Circularly.Polarized.Light.Without.Components.Right.Handed.svg>, public domain.