Fundamentals of Electric Theory and Circuits

by

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Screen shots of growth of electric field around a dipole at various separation distances

From the webpage:
http://ocw.mit.edu/ans7870/18/18.013a/textbook/HTML/chapter28/section04.html
Notice that there is no resultant electric field surrounding the +1 and -1 charges when the separation distance is zero in the Fig. 1.

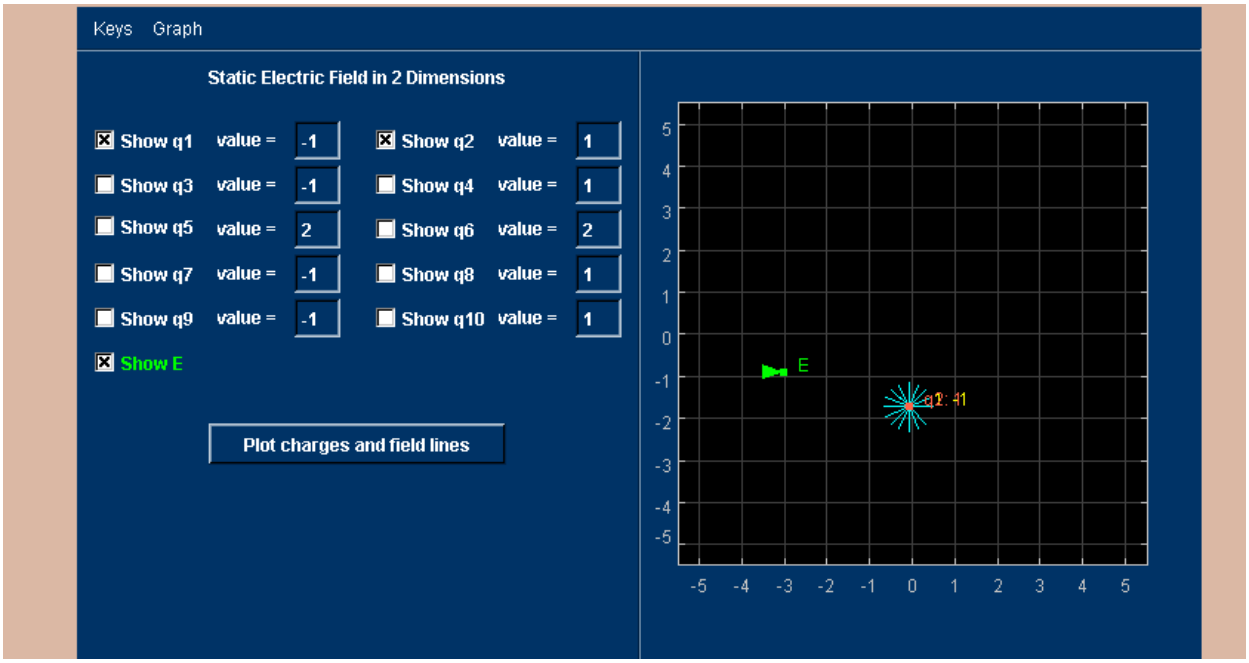

Fig. 1 Electric field of a dipole with separation distance zero

This is an impossible situation in the real world, since if you consider that the positive charge is a proton (of an Hydrogen atom, say) and its electron, then the electron always occupies an orbital space around the nucleus and can never fuse into the proton.

Now, watch the resultant field due to the individual charges surrounding the dipole grow as the separation distance is increased as seen in the screen shot in Fig. 2.

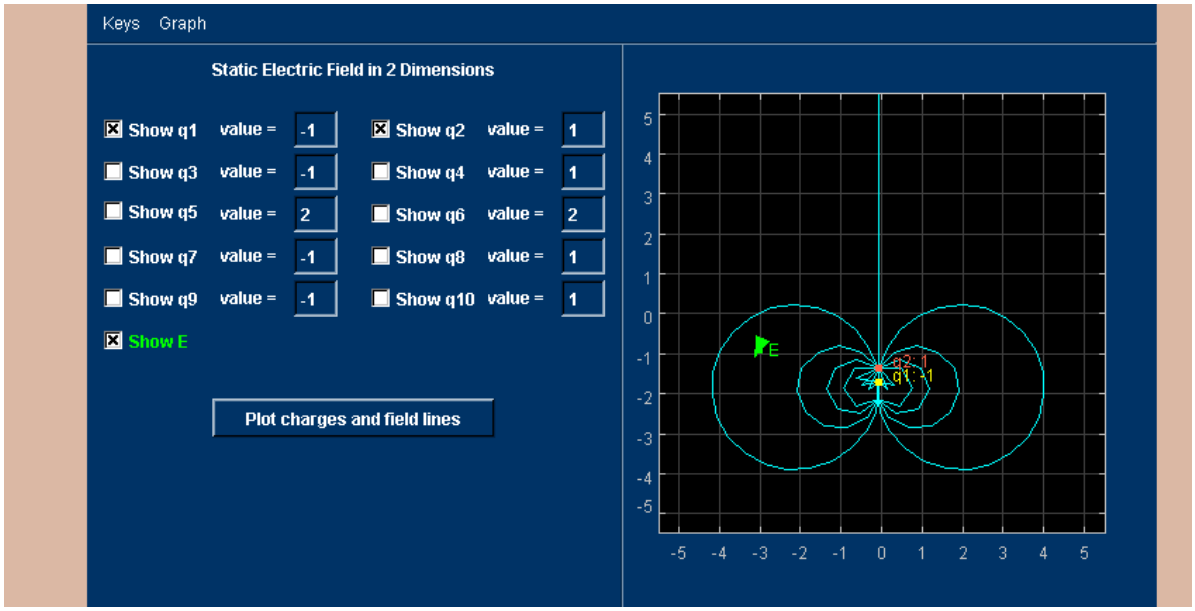

Fig. 2 Electric field of a dipole with a slight separation distance between the dipole charges

The separation distance is increased between the charges and the resultant electric field of the two charges has become significant between the two charges.
A further increase of the separation distance as shown in the screen shot in Fig. 3 causes a more significant resultant electric field around the charge.

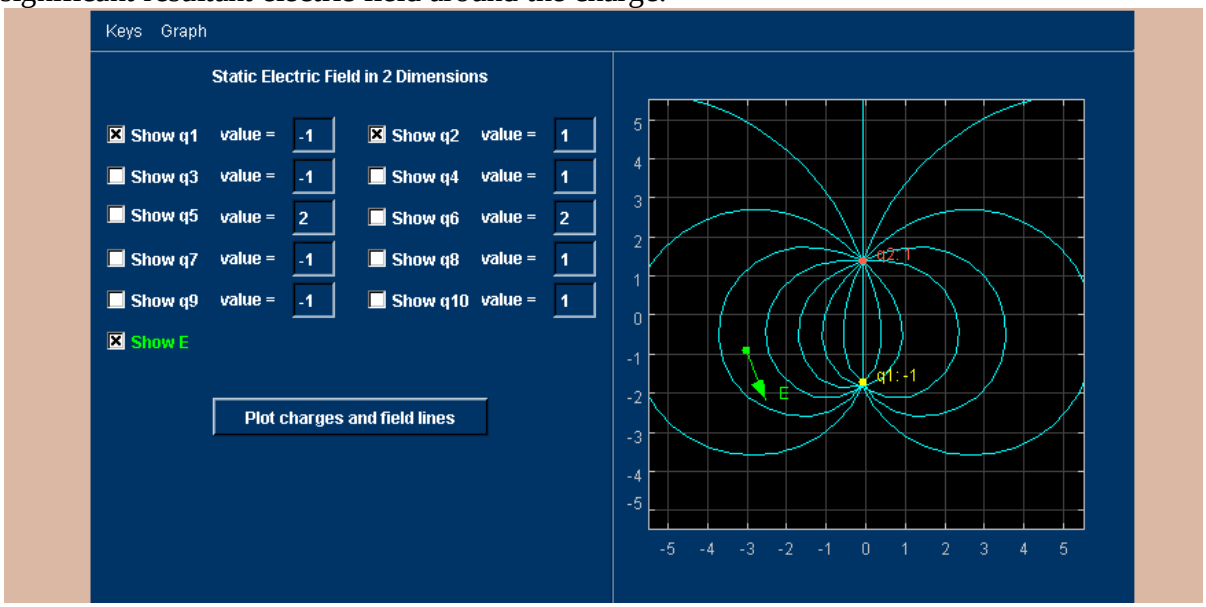

Fig. 3 Electric field of a dipole with a larger separation distance between the dipole charges

I urge the reader to visit the webpage and play interactively with this applet to gain a feel for the presence of the electric field (of course, it is always a "resultant") surrounding a dipole at different dipole separation distances.
The webpage http://ocw.mit.edu/ans7870/8/8.02T/f04/visualizations/electrostatics/14-PithBallsCreate/14-PithCreate_f127_320.html provides a link to a movie showing the growth of the resultant electric field surrounding a pair of unlike charges with important descriptions.