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Subtleties in energy calculations in the image method.

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Summary: In this pedagogical work, we point out a subtle mistake that can be made by undergraduate or graduate students in the computation of the electrostatic energy of a system containing charges and perfect conductors if they naively use the image method. Specifically, we show that naive expressions for the electrostatic energy for these systems obtained directly from the image method are wrong by a factor of $1/2$. We start our discussion with well-known examples, namely point charge-perfectly conducting wall and point charge-perfectly conducting sphere, and then proceed to the demonstration of general results, valid for conductors of arbitrary shapes.

Classification: M55

Keywords: computation of the electrostatic energy

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