

Abstract Submitted
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Behaviour of a conducting inviscid drop subject to an electric field NEVILLE DUBASH, JONATHAN MESTEL, Imperial College London — We present some of the behaviour of an inviscid conducting drop suspended in a viscous insulating fluid subject to an electric field. This work was initially motivated by incidents which occurred with pedestal insulators at power stations. Large ceramic insulators filled with an insulating fluid were compromised when rain water leaked into the interior. This resulted in current spikes across the insulators and in several extreme cases explosion of the entire insulator. It has been previously shown that a conducting drop in an electric field will deform and elongate in the direction of the electric field. In this talk we present two analytic models. The first model, for small deformations from spherical, uses a spheroidal approximation along with an energy balance to determine the drop behaviour. The second model uses slender body theory to determine the behaviour of long thin drops. Finally, the results of numerical computations are presented and compared with the analytic models. While the numerical computations correspond well with the analytic models, they also reveal some new and interesting behaviour.

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