Functional analysis of electrodynamic screen

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***Abstract*—Electrodynamic screen (EDS) is paving its path to be considered as a viable and reliable solution in mitigating soiling losses in solar collector systems. The EDS performance and its durability over a long course of exposure time are significantly dependent upon the electrodes configuration, the transparent dielectric coating layers, the fabrication method, and the applied voltage. In this work, we are developing 2D and 3D models of the EDS in the COMSOL® Multiphysics® finite element analysis (FEA) software in order to examine how the electric field behaves inside the stacked layers of dielectric coatings. In the fabrication method used to prepare EDS samples in the laboratory environment, we inadvertently let an air layer penetrate through the transparent dielectric layers encapsulating deposited electrodes. It is strongly speculated that the trapped air bubbles are leading to significant fraction of failures in the EDS samples in the course of operation. Furthermore, we use conductive epoxy paste to connect the third phase of electrodes. In practice, however, this connection is not perfectly done and the conductive material breed from the specified spots after it has been applied. This breeding decreases the inter-electrode spacing and locally increases the electric field intensity in the vicinity of electrodes. Using the FEA software, we are able to investigate the electric field intensity in complex geometries and effectively model different scenarios of the failures.**