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Modeling of Thermal Arcs in Molded Case Circuit Breakers in Air DOUG BREDEN, SHANKAR MAHADEVAN, Esgee Technologies, LAXMINARAYAN RAJA, University of Texas at Austin — A general-purpose thermal plasma simulation tool (VizArc) was utilized to model a circuit breaker in atmospheric pressure air. The molded case circuit breaker (MCCB) circuit breaker works by separating two metal contacts when the breaking current is exceeded generating an arc. The self-consistent Lorentz force generated by the current pushes the arc into an array of splitter plates which quench the arc and break the circuit. The arc channel is modeled by coupling the electromagnetic equations with flow governing equations to model a multi-species, single-temperature quasi neutral arc plasma. Conjugate heat transfer to the metal splitter plates and vapor ablation into the gas are included in the model. The opening action of the moving contact armature is simulated dynamically in the simulation. The set of all governing equations and their implementation in the model will be discussed, and then the simulations of the MCCB circuit breaker using the model will be presented.

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