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## Coherent Arc behavior in the VAR process

Vacuum Arc Remelting (VAR) is typically the final melting process in the production of a wide range of metallic alloys. The process consists in applying during days a DC current of up to 40 000 A over large electrodes (~1m diameter). A strong DC arc takes place under vacuum between an electrode and a water-cooled copper crucible. For low applied current, high-speed video observation showed that spots formed preferentially in the centre, then moved with retrograde motion to the edge of the electrode. However for higher current it is reported the observation of a slow ensemble arc motion around the axis of the furnace with a time period of 20 to 40 seconds. Depending on the applied current and on the electrode dimension the path follows a butterfly pattern or a circle pattern. When an axial magnetic field is applied, the spots ensemble motion is stabilized at certain off centred position. We will present a numerical model able to explain and predict such coherent arc behaviour.

### Topic

Modeling and Simulations

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