

**AXISYMMETRIC AND 3-D NUMERICAL SIMULATIONS OF  
THERMOMECHANICAL BEHAVIOR DURING THE SPARK PLASMA SINTERING  
“SPS” PROCESS OF POLYCRYSTALLINE MATERIALS: THE EFFECTS OF  
LATERAL SURFACES RADIATION ON THE OVERALL HEAT TRANSFER**

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**ABSTRACT.** Spark Plasma Sintering (SPS) is a promising rapid consolidation technique that allows a better understanding and manipulating of sintering kinetics and therefore makes it possible to obtain polycrystalline materials (ceramic or metallic) with tailored microstructures. A numerical simulation of the electrical, thermal and mechanical coupling during SPS is performed. Equations for conservation for energy, electrical charge and mechanical equilibrium are solved simultaneously. The strong coupling in term of temperature, on the thermal conductivity and electrical resistivity are considered. The effect of lateral surfaces radiation on the overall heat transfer in the SPS system is also considered.