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3D Numerical Simulations of Vacuum Arc Remelting (VAR) Processes ONKAR SAHNI, PECOS/ICES, The University of Texas at Austin, ROBERT MOSER, The University of Texas at Austin — The metallurgical structure of superalloys refined by Vacuum Arc Remelting (VAR) is determined by the behavior of the liquid metal pool that exists at the top of the ingot, which is in turn affected by fluid dynamics, heat transfer, electromagnetics and solidification. In this study, we examine the behavior of the liquid metal pool by constructing a coupled multi-physics model of the processes, and performing 3-dimensional transient simulations. Moreover, through complex coupling and boundary models we account for phenomena observed in industrial experiments including localized electric current density, arc meandering, shrinkage of solid ingot, etc. Of interest in these simulations are the effects of variations in heat influx, electric current supply, and external magnetic field on the pool dynamics and ultimately the quality of the ingot produced.

Onkar Sahni
PECOS/ICES, The University of Texas at Austin

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