High frequency electromagnetic resonant method for metals melting and vaporization

Janis Valdmanis, Aleksandrs Cipijs
Institute of Physics University of Latvia,
Salaspils Miera Str. 32, LV-2169, Latvia, e-mail: jvaldman@sal.lv

In many technological proceses electromagnetic (EM) induction heating, melting and vaporization methods are used. There are some advantages but also disadvantages. The EM interaction process is noncontacting but there are necessary energetic power devices with high electrical current. The idea is to decreace electrical current, but in that cases we need to increace voltage. To realize such concept resonant physical processes in EM systems were investigated. Results of physical research alow to reveal possible applications ways.

In paper results of stright electromagneticof metals heating,melting and vaporization using resonant electromagnetic effects are presented. In that cases interaction effect can be achieved by higher voltage and reduced electrical current. Results of laboratory small scale models isvestigation are presented. Main experiments using Mhz frequency are realized. The resonant method allow to have in local region temaperature high enough to melt and vaporize such metals as wolfram and platina. Various regimes and physical effects are demonsrated. Heating effects are concentrated in resonant circuit discharging zone. Discharging regime when on electrode surface stable liquid film are generated is shown. The physics of plasma effects on heated surface are discussed. All experimental work are done at atmospheric pressure .The processes in vacuum case need special investigations.