Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Shape Oscillation of a Sessile Drop Under the Effect of Amplitude-Modulated High Frequency Magnetic Field[1] ZUO-SHENG LEI, Shanghai Key Laboratory of Modern Metallurgy & Material Processing, Shanghai University, Shanghai, China, JIA-HONG GUO, Shanghai Institute of Applied Mathematics and Mechanics, Shanghai University, Shanghai, China, LI-JIE ZHANG, ZHONG-MING REN, Shanghai Key Laboratory of Modern Metallurgy & Material Processing, Shanghai University, Shanghai, China, YVES FAUTRELLE, JECQUELINE ETAY, SIMAP-EPM-Madylam/CNRS, ENSHMG, BP 95, 38402 St. Martin d'Heres Cedex, France — The shape oscillation of a sessile mercury drop under the effect of high frequency amplitude-modulated magnetic field (AMMF) is investigated experimentally. It is a new method to excite shape oscillation of a liquid metal sessile drop, which is different from the case in the presence of a low-frequency magnetic field. The high frequency AMMF is generated by a solenoid inductor fed by a specially designed alternating electric current. The surface contour of the sessile drop is observed by a digital camera. At a given frequency and magnetic flux density of the high frequency AMMF, the edge deformations of the drop with an azimuthal wave numbers (modes n =2, 3, 4, 5, 6) were excited. A stability diagram of the shape oscillation of the drop is obtained by analysis of the experimental data. It is found that the same oscillation mode is excited in different frequency range, and the corresponding frequencies have a ratio of 2. This is a typical character of Mathieu-type parametric instability of a liquid drop.

[1]Project supported by the National Natural Science Foundation of China (Grant No. 11372174, 51274137)

Jia-Hong Guo
Shanghai Institute of Applied Mathematics and Mechanics,
Shanghai University, Shanghai, China

Date submitted: 27 Jun 2014 Electronic form version 1.4