PRODUCING MONOSIZED DROPLETS BY VIBRATIONAL EXCITATED PNEUMATIC NOZZLES

T. Linnepe, M. Heitkamp and P. Walzel
mv@ct.uni-dortmund.de
Department of Mechanical Engineering, University of Dortmund,
Emil-Figge-Strasse 68, D-44227 Dortmund, Germany

Monosized drops are desired in many production processes as catalyst beads, ion exchangers and pharmaceutical applications. The classical method, i.e. the Rayleigh jet disintegration supported by imposed periodic oscillations leads to practically monosized drops which may be solidified in a further step by different methods. In case of suspensions the large ratio of 2 between drop size and nozzle diameter is a critical drawback. Small capillaries required in case of small drops, tend to be clogged after a short running time. A new method combines the stretching effect of a pneumatic nozzle with the superimposed oscillation. By this means it is possible to produce equal sized droplets from capillaries with diameters up to 5 times the diameter of the drops.

In previous works the influence of the frequency on the mean droplet size and droplet size distribution was investigated. Recently the influence of the amplitude on both droplet size and point of jet disintegration was examined. By additional measurement of the amplitude all parameters are characterized to determine the operation range of the vibrational excitated pneumatic nozzle.

The amplitude is measured by a Laser-Vibrometer. The optimal frequencies and amplitudes of the excitation are determined. The size of the droplets is determined by optical analysis.