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MATHEMATICAL ANALYSIS ON THE SIMULATED MICROGRAVITY RESULTING FROM THE
RANDOM POSITIONING MACHINE

Abstract

The incubator for 3D tissue culture in simulated space environment, achieved through gravity dispersion by the Random Positioning Machine (RPM), was manufactured, and the theoretical background by means of the mathematical definition of gravity dispersion was developed and discussed. The new parameter to quantify the gravity dispersion, Degree of Gravity Dispersion (DGD), was defined, and the Linear Sawtooth (LS) and the Parabolic Sawtooth (PS) angular velocity profiles of the outer rotational frame, which can effectively replicate the microgravity environment, were suggested and their effectiveness was numerically verified using in-house program. The mathematical theory discussed in this study presents for the first time, and it can be utilized as an important theory in the future research of 3D tissue culture incubator.