MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Microgravity Sciences Onboard the International Space Station and Beyond - Part 1 (6)

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COMPARATIVE ISS ACCELEROMETRIC ANALYSES

Abstract

A real accelerometric record, the so-called Run 29 of the Influence of VIbrations on DIffusion of Liquids, IVIDIL experiment has been studied here using standard digital signal analysis techniques [1, 2]. Results involved the consideration of basic statistical properties of the three accelerometric Cartesian components as well as the corresponding histograms, the correlograms, the power spectra, the cross correlations and the signal coherences. An identical second order digital analysis has been performed using another accelerometric digital signal with similar characteristics but from the Space Acceleration Measurement System II f03 (SAMSII f03) instrument. The starting time is roughly the same as in Run 29 (10h 46min 15s, 08/12/2009) but due to the sampling rate is five times faster – there is no available data at 100 Hz - the final time we considered is considerably less (14h 26min 15s, 08/12/2009) in order to have roughly the same number of data in the file. The quantitative information has been obtained simply downloading and reading the corresponding public binary files from the web [3]. The comparison of the results obtained in both cases show several differences which we interpreted as a direct consequence of the accelerometric isolation offered by the IVIDIL experiment itself or by the Glovebox, one of the different ten payload racks that can be accommodated in the European Columbus module of the ISS. Remember that the Glovebox facility offers an enclosed 255-liter work area accessible to the crew through glove ports. Because this work area is sealed and held at a negative pressure, the crew can manipulate experiment hardware and samples without the danger of small parts, particulates, fluids, or gasses escaping into the open laboratory module.

[1] V. Shevtsova, IVIDIL accelerometric data, 2012.

[2] N. Saez, S. Cito, X. Ruiz, J. Pallarés, V. Shevtsova, On the accuracy of the interdiffusion coefficient measurements of high temperature binary mixtures under ISS real conditions, 10th International Meeting on Thermodiffusion, IMT 10. Brussels, Belgium 2012.

[3] http://pims.grc.nasa.gov/html/ISSAccelerationArchive.html.