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Proper Orthogonal Decomposition of Flow-Field in Non-Stationary Geometry VICTOR TROSHIN, School of Mechanical Engineering, faculty of Engineering, Tel Aviv University, AVRAHAM SEIFERT, TAU, DAVID SIDILKOVER, SOREQ NRC, GILEAD TADMOR, Northeastern — This work presents a proper orthogonal decomposition (POD) methodology for a flow field in a domain with moving boundaries. A relatively simple volume preserving mapping which transforms a deforming to stationary domain is described. This mapping was created by combining a transfinite interpolation and volume adjustment algorithm. The algorithm is based on iterative solution of the Laplace equation with respect to the displacement potential of the grid points. The transformed domain is suitable for proper orthogonal decomposition procedure. The presented mapping can be applied to a wide variety of flow problems which contain single or in some cases multiple deforming boundaries. Currently, this method is presented for 2D geometries, however, it can be expanded to 3D cases. This approach can assist in creation of low order models for complex aero-elastic systems which to date could not be analysed by existing POD approaches. Finally, the method is demonstrated on CFD results of pitching and plunging ellipse in still fluid.

Avraham Seifert
School of Mechanical Engineering, faculty of Engineering, Tel Aviv University

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