This paper studies the effect of brush seal segmentation on the seal performance characteristics. A brush-labyrinth sealing configuration arranged of one brush seal downstream and two labyrinth fins upstream is studied experimentally and theoretically. The studied brush seal is of welded design installed with zero cold radial clearance. The brush seal front and back rings as well as the bristle pack are segmented radially in a single plane using the electrical discharge machining technique. The segmentation procedure results in loss of bristles at the site of the cuts altering the leakage flow structure in the seal and its performance characteristics. Two test rigs are used to obtain leakage, as well as rotodynamic stiffness and damping coefficients of the seal at different pressure ratios. The CFD-based model is used to predict the seal performance and to study in detail local changes in the flow field due to the segmentation. A back-to-back comparison of the performance of non-segmented and segmented brush seals, as well as baseline labyrinth seal is provided. The obtained results demonstrate that the segmentation in general negatively affects the performance of the studied brush-labyrinth sealing.
configuration. However, the segmented brush seal shows increased direct damping coefficients.