Heterodyne velocity measurements (PDV) in media with rapidly changing refractive index

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Optical effects arising during the registration of the boundary velocity by the Doppler heterodyne velocity measurement technique (Photon Doppler velocimetry, PDV) through transparent media are considered. It is shown that when the mass thickness of the intermediate medium changes along the laser beam, a discrepancy between the actual and apparent velocity is observed. The correction factor observed in this case (the ratio of these velocities) is not constant. Formulas for calculating the apparent velocity in hydrocode modeling are obtained. Computational and experimental data of plane experiments, experiments with axial and spherical symmetry of compression of the intermediate medium are presented, proving the presence of the effect and the correctness of the presented formulas.