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Dynamic Masking of PIV Images using Deep Learning BERNHARD VENNEMANN, THOMAS RSGEN, Institute of Fluid Dynamics, ETH Zurich — Masking of foreign objects in PIV image frames is required to avoid correlation bias from interrogation windows overlapping the object. Automatic masking strategies are required in the presence of moving or deforming objects, where manual masking efforts become unfeasible. We developed a dynamic masking technique based on convolutional autoencoders (a special type of convolutional neural network) to mask semi-transparent, moving and deforming objects from the PIV image frame. The neural network was trained both, using the PIV image sequence to be masked or synthetic PIV images exclusively. The proposed deep learning approach was found to yield improvements over existing methods, especially for objects of high transparency and scenarios with high seeding density. We tested the method using real-world PIV data of a swimming jellyfish, where the highly transparent animal could be successfully extracted from the images. A quantitative evaluation of synthetic benchmark images confirmed that masks could be produced with high fidelity at an average shape deviation of less than one pixel.

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