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**Error Propagation dynamics of PIV-based pressure calculation 2: from Poisson equations to Kirchhoff plates** ZHAO PAN, JARED WHITEHEAD, TADD TRUSCOTT, Utah State University — Little research has been done to investigate the dynamics of error propagation from PIV-based velocity measurements to the pressure calculation. Rather than measure experimental error, we analytically investigate error propagation by examining the properties of the Poisson equationdirectly. Our results provide two contributions to the PIV community. First, we quantify the error bound in the pressure field by illustrating the mathematical roots of why and how PIV-based pressure calculations propagate.Second, we design the "worst case error" for a pressure Poisson solver. In other words, we provide a systematic example where the relatively small errors in the experimental data can lead to maximum error in the corresponding pressure calculations.The 2D calculation of the worst case error surprisingly leads to the classic Kirchhoff plates problem, and connects the PIV-based pressure calculation, which is a typical fluid problem, to elastic dynamics. The results can be used for optimizing experimental error minimization by avoiding worst case scenarios. More importantly, they can be used to design synthetic velocity error for future PIV-pressure challenges, which can be the hardest test case in the examinations.

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