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激光与光电子技术应用

反远距成像相移剪切散斑干涉检测系统

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摘要： 为了扩大传统剪切散斑干涉仪的检测视场，设计了一种反远距成像迈克尔逊式剪切散斑干涉系统。采用负透镜组与标准成像镜头组成反远距成像系统，分析了光路的成像参量，并利用ZEMAX软件进行了模拟；讨论了发散光路时间相移的非均匀性，采用等步长相移算法进行相位解算可以弥补非均匀误差；并对中心加载的橡胶平板进行了测量。结果表明，该系统能有效地扩大成像视场，采用3片焦距为-75mm的平凹镜片可以实现70°视场角的散斑干涉检测，通过调整平凹镜片的焦距和数量可以实时调整成像视场。

关键词： 激光技术 散斑干涉 反远距成像 视场

Phase shifting and shearing speckle interferometry system with retro-focus imaging

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Abstract: A retro-focus Michelson type shearing speckle interferometry imaging system was proposed to extend the field of view (FOV) for a speckle shearing interferometer. The retro-focus imaging system includes negative lens group and television lens. Analysis of the optical setup was taken out and the simulation was demonstrated by ZEMAX software. The phase shifting unit was a plane mirror attached with a piezo, the non-uniform phase difference caused by the tilted mirror was discussed. The equal-step Carre algorithm was used to calculate the phase map so that the non-uniform phase error was avoided. The experiment results of center loaded metal plane show this method can achieve large FOV detection system. A 70° FOV imaging system can be implemented by using three plano-concave lenses with -75mm focus length and the FOV can be adjusted by changing the focus length and number of lenses.

Keywords: laser technique speckle interferometry retro-focus imaging field of view

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