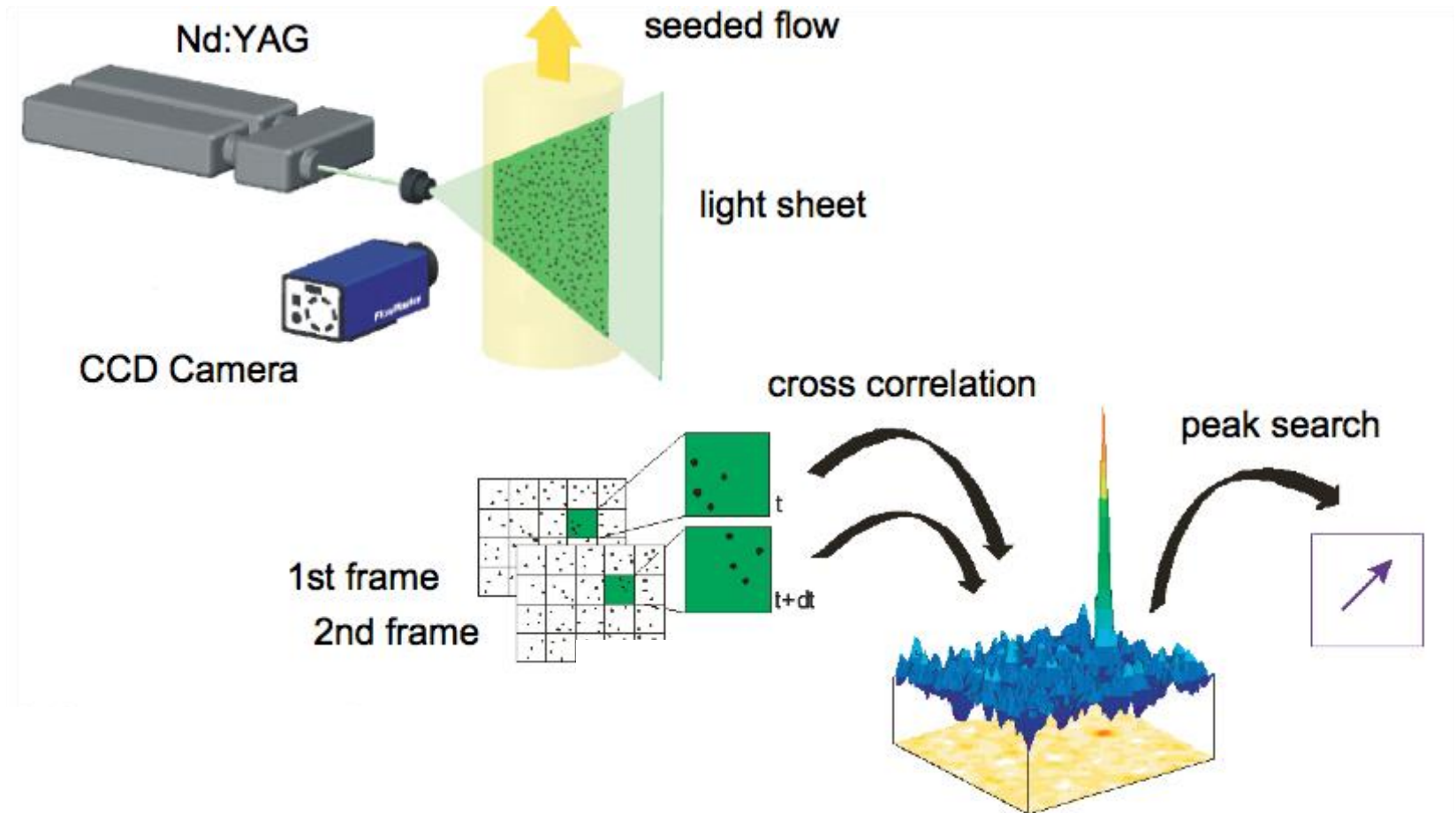


# Digital Image Correlation (DIC)

Quantification of Strain Field  
(not stress field)



	$G$	$K$	$E$	$\nu$
$G, E$		$\frac{GE}{3(3G-E)}$		$\frac{E-2G}{2G}$
$G, \nu$		$\frac{2G(1+\nu)}{3(1-2\nu)}$	$2G(1 + \nu)$	
$G, K$			$\frac{9KG}{3K+G}$	$\frac{1}{2} \left[ \frac{3K-2G}{3K+G} \right]$
$E, \nu$	$\frac{E}{2(1+\nu)}$	$\frac{E}{3(1-2\nu)}$		
$E, K$	$\frac{3EK}{9K-E}$			$\frac{1}{2} \left[ \frac{3K-E}{3K} \right]$
$\nu, K$	$\frac{3K(1-2\nu)}{2(1+\nu)}$		$3K(1 - 2\nu)$	

# Summary of Isotropic Linear Elasticity

(in 3D)

## EQUATIONS:

\* STRAIN - DISPLACEMENT:

$$\epsilon_{ij} = \frac{1}{2} \left( \frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i} \right) \quad \boxed{6 \text{ Eqs.}}$$

\* EQUILIBRIUM:

$$\sum_{j=1}^3 \frac{\partial \sigma_{ij}}{\partial x_j} + \rho g_i = 0 \quad \boxed{3 \text{ Eqs.}}$$

\* CONSTITUTIVE RELATION (ELASTICITY)

$$\underline{\sigma} = K \text{tr}(\underline{\epsilon}) \underline{I} + 2G \underline{\epsilon}' \quad \boxed{6 \text{ Eqs.}}$$

## UNKNOWN

\* DISPLACEMENT:

$$\underline{u}(\underline{x}) \quad \boxed{3 \text{ UNKNOWN}}$$

\* STRESS TENSOR

$$\underline{\sigma}(\underline{x}) \quad \boxed{6 \text{ UNKNOWN}}$$

\* STRAIN TENSOR:

$$\underline{\epsilon}(\underline{x}) \quad \boxed{6 \text{ UNKNOWN}}$$

15 EQUATIONS (SOME ARE P.D.E's) !!!

15 UNKNOWN + B.C.s in 3D