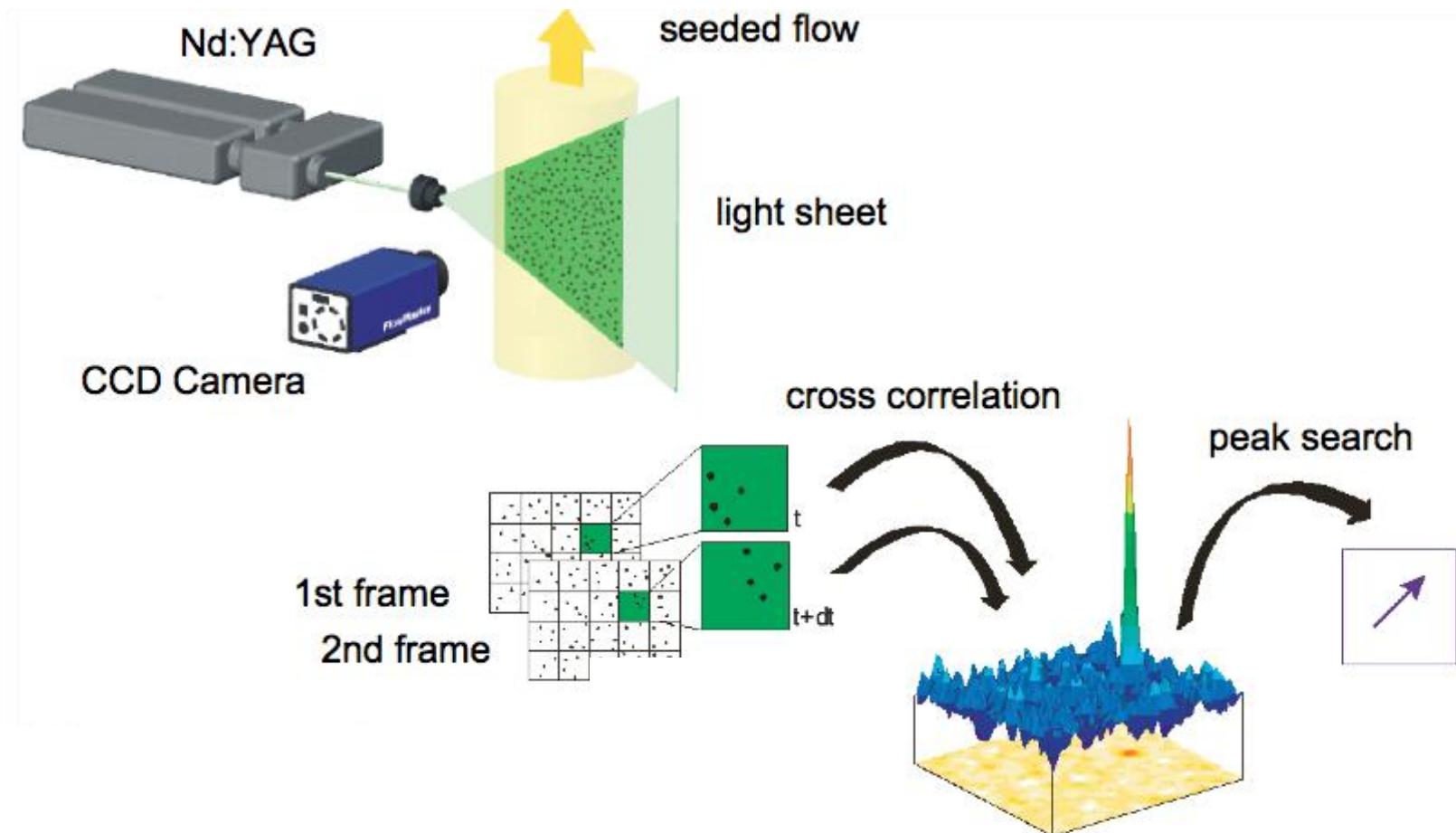


Digital Image Correlation (DIC)

Quantification of Strain Field
(not stress field)



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

Summary of Isotropic Linear Elasticity (in 3D)

EQUATIONS:

* STRAIN - DISPLACEMENT:

$$\epsilon_{ij} = \frac{1}{2} \left(\frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i} \right)$$

6 Eqs.

* EQUILIBRIUM:

$$\sum_{j=1} \frac{\partial \sigma_{ij}}{\partial x_j} + \rho g_i = 0$$

3 Eqs.

* CONSTITUTIVE RELATION (Elasticity)

$$\sigma = K \text{tr}(\epsilon) I + 2 G \epsilon'$$

6 Eqs.

UNKNOWNs

* DISPLACEMENT:

$$u(x)$$

3 UNKNOWNs

* STRESS TENSOR

$$\sigma(x)$$

6 UNKNOWNs

* STRAIN TENSOR:

$$\epsilon(x)$$

6 UNKNOWNs

15 EQUATIONS (SOME ARE PDEs) !!!

15 UNKNOWNs + B.C.s IN 3D