

# Introduction to L<sup>A</sup>T<sub>E</sub>X

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## Abstract

The abstract text goes here.

## 1 Velocity Field & Related Variables

The velocity field is defined

$$\alpha = \sqrt{\beta} \tag{1}$$

### 1.1 Subsection Heading Here

Write your subsection text here. here is a much longer line of text to see if I can understand where the margins land.

Expression	Code	Variable	Expression	Code	Variable	Expression	Code	Variable
$v_r$	1	v_r	$\frac{\partial v_\phi}{\partial \theta}$	21	dv_phi_dt	$\frac{1}{r} \frac{\partial v'_r}{\partial \theta}$	41	dvp_theta_dtr
$v_\theta$	2	v_theta	$\frac{\partial v'_r}{\partial \theta}$	22	dvp_r_dt	$\frac{1}{r} \frac{\partial v'_\theta}{\partial \theta}$	42	dvp_phi_dtr
$v_\phi$	3	v_phi	$\frac{\partial v'_\theta}{\partial \theta}$	23	dvp_theta_dt	$\frac{1}{r} \frac{\partial \overline{v_r}}{\partial \theta}$	43	dvm_r_dtr
$v'_r$	4	vp_r	$\frac{\partial v'_\phi}{\partial \theta}$	24	dvp_phi_dt	$\frac{1}{r} \frac{\partial \overline{v_\theta}}{\partial \theta}$	44	dvm_theta_dtr
$v'_\theta$	5	vp_theta	$\frac{\partial \overline{v_r}}{\partial \theta}$	25	dvm_r_dt	$\frac{1}{r} \frac{\partial \overline{v_\phi}}{\partial \theta}$	45	dvm_phi_dtr
$v'_\phi$	6	vp_phi	$\frac{\partial \overline{v_\theta}}{\partial \theta}$	26	dvm_theta_dt	$\frac{1}{r \sin \theta} \frac{\partial v_r}{\partial \phi}$	46	dv_r_dprs
$\overline{v_r}$	7	vm_r	$\frac{\partial \overline{v_\phi}}{\partial \theta}$	27	dvm_phi_dt	$\frac{1}{r \sin \theta} \frac{\partial v_\theta}{\partial \phi}$	47	dv_theta_dprs
$\overline{v_\theta}$	8	vm_theta	$\frac{\partial v_r}{\partial \phi}$	28	dv_r_dp	$\frac{1}{r \sin \theta} \frac{\partial v_\phi}{\partial \phi}$	48	dv_phi_dprs
$\overline{v_\phi}$	9	vm_phi	$\frac{\partial v_\theta}{\partial \phi}$	29	dv_theta_dp	$\frac{1}{r \sin \theta} \frac{\partial v'_r}{\partial \phi}$	49	dvp_r_dprs
$\frac{\partial v_r}{\partial r}$	10	dv_r_dr	$\frac{\partial v_\phi}{\partial \phi}$	30	dv_phi_dp	$\frac{1}{r \sin \theta} \frac{\partial v'_\theta}{\partial \phi}$	50	dvp_theta_dprs
$\frac{\partial v_\theta}{\partial r}$	11	dv_theta_dr	$\frac{\partial v'_r}{\partial \phi}$	31	dvp_r_dp	$\frac{1}{r \sin \theta} \frac{\partial v'_\phi}{\partial \phi}$	51	dvp_phi_dprs
$\frac{\partial v_\phi}{\partial r}$	12	dv_phi_dr	$\frac{\partial v'_\theta}{\partial \phi}$	32	dvp_theta_dp	$\frac{1}{r \sin \theta} \frac{\partial \overline{v_r}}{\partial \phi}$	52	dvm_r_dprs
$\frac{\partial v'_r}{\partial r}$	13	dvp_r_dr	$\frac{\partial v'_\phi}{\partial \phi}$	33	dvp_phi_dp	$\frac{1}{r \sin \theta} \frac{\partial \overline{v_\theta}}{\partial \phi}$	53	dvm_theta_dprs
$\frac{\partial v'_\theta}{\partial r}$	14	dvp_theta_dr	$\frac{\partial \overline{v_r}}{\partial \phi}$	34	dvm_r_dp	$\frac{1}{r \sin \theta} \frac{\partial \overline{v_\phi}}{\partial \phi}$	54	dvm_phi_dprs
$\frac{\partial v'_\phi}{\partial r}$	15	dvp_phi_dr	$\frac{\partial \overline{v_\theta}}{\partial \phi}$	35	dvm_theta_dp	$\frac{\partial^2 v_r}{\partial r^2}$	55	dv_r_d2r
$\frac{\partial \overline{v_r}}{\partial r}$	16	dvm_r_dr	$\frac{\partial \overline{v_\phi}}{\partial \phi}$	36	dvm_phi_dp	$\frac{\partial^2 v_\theta}{\partial r^2}$	56	dv_theta_d2r
$\frac{\partial \overline{v_\theta}}{\partial r}$	17	dvm_theta_dr	$\frac{1}{r} \frac{\partial v_r}{\partial \theta}$	37	dv_r_dtr	$\frac{\partial^2 v_\phi}{\partial r^2}$	57	dv_phi_d2r
$\frac{\partial \overline{v_\phi}}{\partial r}$	18	dvm_phi_dr	$\frac{1}{r} \frac{\partial v_\theta}{\partial \theta}$	38	dv_theta_dtr	$\frac{\partial^2 v'_r}{\partial r^2}$	58	dvp_r_d2r
$\frac{\partial v_r}{\partial \theta}$	19	dv_r_dt	$\frac{1}{r} \frac{\partial v_\phi}{\partial \theta}$	39	dv_phi_dtr	$\frac{\partial^2 v'_\theta}{\partial r^2}$	59	dvp_theta_d2r
$\frac{\partial v_\theta}{\partial \theta}$	20	dv_theta_dt	$\frac{1}{r} \frac{\partial v'_r}{\partial \theta}$	40	dvp_r_dtr	$\frac{\partial^2 v'_\phi}{\partial r^2}$	60	dvp_phi_d2r

Expression	Code	Variable	Expression	Code	Variable	Expression	Code	Variable
$\frac{\partial^2 \overline{v_r}}{\partial r^2}$	61	dvm_r_d2r	$\frac{\partial^2 \overline{v_\phi}}{\partial \phi^2}$	81	dvm_phi_d2p	$\frac{\partial^2 v_\theta}{\partial \theta \partial \phi}$	101	dv_theta_d2tp
$\frac{\partial^2 \overline{v_\theta}}{\partial r^2}$	62	dvm_theta_d2r	$\frac{\partial^2 v_r}{\partial r \partial \theta}$	82	dv_r_d2rt	$\frac{\partial^2 v_\phi}{\partial \theta \partial \phi}$	102	dv_phi_d2tp
$\frac{\partial^2 \overline{v_\phi}}{\partial r^2}$	63	dvm_phi_d2r	$\frac{\partial^2 v_\theta}{\partial r \partial \theta}$	83	dv_theta_d2rt	$\frac{\partial^2 v'_r}{\partial \theta \partial \phi}$	103	dvp_r_d2tp
$\frac{\partial^2 v_r}{\partial \theta^2}$	64	dv_r_d2t	$\frac{\partial^2 v_\phi}{\partial r \partial \theta}$	84	dv_phi_d2rt	$\frac{\partial^2 v'_\theta}{\partial \theta \partial \phi}$	104	dvp_theta_d2tp
$\frac{\partial^2 v_\theta}{\partial \theta^2}$	65	dv_theta_d2t	$\frac{\partial^2 v'_r}{\partial r \partial \theta}$	85	dvp_r_d2rt	$\frac{\partial^2 v'_\phi}{\partial \theta \partial \phi}$	105	dvp_phi_d2tp
$\frac{\partial^2 v_\phi}{\partial \theta^2}$	66	dv_phi_d2t	$\frac{\partial^2 v'_\theta}{\partial r \partial \theta}$	86	dvp_theta_d2rt	$\frac{\partial^2 \overline{v_r}}{\partial \theta \partial \phi}$	106	dvm_r_d2tp
$\frac{\partial^2 v'_r}{\partial \theta^2}$	67	dvp_r_d2t	$\frac{\partial^2 v'_\phi}{\partial r \partial \theta}$	87	dvp_phi_d2rt	$\frac{\partial^2 \overline{v_\theta}}{\partial \theta \partial \phi}$	107	dvm_theta_d2tp
$\frac{\partial^2 v'_\theta}{\partial \theta^2}$	68	dvp_theta_d2t	$\frac{\partial^2 \overline{v_r}}{\partial r \partial \theta}$	88	dvm_r_d2rt	$\frac{\partial^2 \overline{v_\phi}}{\partial \theta \partial \phi}$	108	dvm_phi_d2tp
$\frac{\partial^2 v'_\phi}{\partial \theta^2}$	69	dvp_phi_d2t	$\frac{\partial^2 \overline{v_\theta}}{\partial r \partial \theta}$	89	dvm_theta_d2rt			
$\frac{\partial^2 \overline{v_r}}{\partial \theta^2}$	70	dvm_r_d2t	$\frac{\partial^2 \overline{v_\phi}}{\partial r \partial \theta}$	90	dvm_phi_d2rt			
$\frac{\partial^2 \overline{v_\theta}}{\partial \theta^2}$	71	dvm_theta_d2t	$\frac{\partial^2 v_r}{\partial r \partial \phi}$	91	dv_r_d2rp			
$\frac{\partial^2 \overline{v_\phi}}{\partial \theta^2}$	72	dvm_phi_d2t	$\frac{\partial^2 v_\theta}{\partial r \partial \phi}$	92	dv_theta_d2rp			
$\frac{\partial^2 v_r}{\partial \phi^2}$	73	dv_r_d2p	$\frac{\partial^2 v_\phi}{\partial r \partial \phi}$	93	dv_phi_d2rp			
$\frac{\partial^2 v_\theta}{\partial \phi^2}$	74	dv_theta_d2p	$\frac{\partial^2 v'_r}{\partial r \partial \phi}$	94	dvp_r_d2rp			
$\frac{\partial^2 v_\phi}{\partial \phi^2}$	75	dv_phi_d2p	$\frac{\partial^2 v'_\theta}{\partial r \partial \phi}$	95	dvp_theta_d2rp			
$\frac{\partial^2 v'_r}{\partial \phi^2}$	76	dvp_r_d2p	$\frac{\partial^2 v'_\phi}{\partial r \partial \phi}$	96	dvp_phi_d2rp			
$\frac{\partial^2 v'_\theta}{\partial \phi^2}$	77	dvp_theta_d2p	$\frac{\partial^2 \overline{v_r}}{\partial r \partial \phi}$	97	dvm_r_d2rp			
$\frac{\partial^2 v'_\phi}{\partial \phi^2}$	78	dvp_phi_d2p	$\frac{\partial^2 \overline{v_\theta}}{\partial r \partial \phi}$	98	dvm_theta_d2rp			
$\frac{\partial^2 \overline{v_r}}{\partial \phi^2}$	79	dvm_r_d2p	$\frac{\partial^2 \overline{v_\phi}}{\partial r \partial \phi}$	99	dvm_phi_d2rp			
$\frac{\partial^2 \overline{v_\theta}}{\partial \phi^2}$	80	dvm_theta_d2p	$\frac{\partial^2 v_r}{\partial \theta \partial \phi}$	100	dv_r_d2tp			

Expression	Code	Variable	Expression	Code	Variable	Expression	Code	Variable
$\hat{\rho}v_r$	109	rhov_r						
$\hat{\rho}v_\theta$	110	rhov_theta						
$\hat{\rho}v_\phi$	111	rhov_phi						
$\hat{\rho}v'_r$	112	rhovp_r						
$\hat{\rho}v'_\theta$	113	rhovp_theta						
$\hat{\rho}v'_\phi$	114	rhovp_phi						
$\hat{\rho}\langle v_r \rangle$	115	rhovm_r						
$\hat{\rho}\langle v_\theta \rangle$	116	rhovm_theta						
$\hat{\rho}\langle v_\phi \rangle$	117	rhovm_phi						

## 1.2 Mass Flux

## 1.3 Vorticity

## 2 Conclusion

Write your conclusion here.

Expression	Code	Variable	Expression	Code	Variable	Expression	Code	Variable
$\omega_r$	118	vort_r						
$\omega_\theta$	119	vort_theta						
$\omega_\phi$	120	vort_phi						
$\omega'_r$	121	vortp_r						
$\omega'_\theta$	122	vortp_theta						
$\omega'_\phi$	123	vortp_phi						
$\overline{\omega_r}$	124	vortm_r						
$\overline{\omega_\theta}$	125	vortm_theta						
$\overline{\omega_\phi}$	126	vortm_phi						
$\omega \cdot \omega$	127	enstrophy						
$\omega' \cdot \overline{\omega}$	128	enstrophy_pm						
$\overline{\omega} \cdot \overline{\omega}$	129	enstrophy_mm						
$\omega' \cdot \omega'$	130	enstrophy_pp						