

In[\*]:= **s = Solve**[ $\{-w^2 m v A v == -k A v + k A f - v (-I w A v + I w A f),$   
└─解方程 └─虚数单位 └─虚数单位  
 $-w^2 (m f + m a) A f == -k A f + k A v + v (-I w A v + I w A f) + I u w A f - r A f + f\}$ , {A v, A f}]  
└─虚数单位 └─虚数单位 └─虚数单位

Out[\*]=  $\left\{ \left\{ A v \rightarrow \frac{f (-k + i v w)}{(-k + i v w)^2 - (k + r - i u w - i v w - (m a + m f) w^2) (k - i v w - m v w^2)}, \right. \right.$   
 $A f \rightarrow - \left( \left( f (k - i v w - m v w^2) \right) / \left( -k r + i k u w + i r v w + k m a w^2 + k m f w^2 + k m v w^2 + m v r w^2 + \right. \right.$   
 $\left. \left. u v w^2 - i m v u w^3 - i m a v w^3 - i m f v w^3 - i m v v w^3 - m a m v w^4 - m f m v w^4 \right) \right) \left. \right\} \}$

In[\*]:=

$$a v = \frac{f (-k + i v w)}{(-k + i v w)^2 - (k + r - i u w - i v w - (m a + m f) w^2) (k - i v w - m v w^2)};$$

$$a f = - \left( \left( f (k - i v w - m v w^2) \right) / \left( -k r + i k u w + i r v w + k m a w^2 + k m f w^2 + k m v w^2 + m v r w^2 + \right. \right.$$

$$\left. \left. u v w^2 - i m v u w^3 - i m a v w^3 - i m f v w^3 - i m v v w^3 - m a m v w^4 - m f m v w^4 \right) \right) \left. \right);$$

In[\*]:=

**m v = 2433;**  
**m f = 4866;**  
**k = 80 000;**  
**g = 9.8;**  
**r = 1025 \* g \* Pi;**  
└─圆周率

**w = 2.2143;**  
**m a = 1165.992;**  
 **$\mu = u = 167.8395$ ;**  
**f = 4890;**

In[\*]:= **p = Integrate** $\left[v \frac{1}{2 \text{Pi} / w} (D[\text{Re}[a f] \text{Cos}[w t] + \text{Im}[a f] \text{Sin}[w t], t) - \right.$   
└─积分  
 $\left. D[\text{Re}[a v] \text{Cos}[w t] + \text{Im}[a v] \text{Sin}[w t], t) \right)^2, \{t, 0, 2 \text{Pi} / w\}$ ];  
└─圆周率

In[\*]:= **p1 = Together**[**ComplexExpand**[p]];  
└─归并 └─复展开

In[\*]:= **Solve**[**D**[p1, v] == 0 && **D**[p1, {v, 2}] < 0 && v > 0, v, **Reals**]  
└─解方程 └─偏导 └─实数域

Out[\*]= {{v → 37 193.8}}