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Navier ideas for molecular motion of fluid

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Abstract

The particle interactions and the effect of minute particle separation for their reduction for mass and energy ratio is to guide the motion of the matter in the space. Additionally here was found the one of the exotic properties of liquid namely super fluidity.

Keywords: Navier, Fluidity

Discussion

The state of matter is transforming in the space to the influence of external and internal forces. If the system has changing much d x or infinitesimal changes δx.then the applied force f(r) $=F^i + F^e$and the magnitude of the force is depend on the r.The change in distance is $\delta(r^{'} - r)$ and the total change energy in the space is $\delta(E^{'} - E) = f(\mathrm{r})\delta(r^{'} - r)$.

The molecules were altering the position to the applied pressure p for the change in pressure is $(p - \delta p)$.The change in pressure within the liquid to alter the density of the liquid $\frac{d\rho}{dt}$ further density changing in the different direction with state of potential in the co-ordinate space. Then the flow of molecular motion in the space is,

$$p - \delta p = \frac{d\rho(r)}{dt} + (\frac{\partial\rho(r)}{\partial x}\delta x + \frac{\partial\rho(r)}{\partial y}\delta y + \frac{\partial\rho(r)}{\partial z}\delta z)$$

$$p - (\frac{\partial p}{\partial x}\delta x + \frac{\partial p}{\partial y}\delta y + \frac{\partial p}{\partial z}\delta z) = \frac{d\rho}{dt} + (\frac{\partial\rho(r)}{\partial x}\delta x + \frac{\partial\rho(r)}{\partial y}\delta y + \frac{\partial\rho(r)}{\partial z})$$

$$p - (\frac{\partial p}{\partial x}\delta x + \frac{\partial p}{\partial y}\delta y + \frac{\partial p}{\partial z}\delta z) = \frac{d\rho}{dt} + V(r)$$

Multiply both sides d x, d y and d z,

$$(p - \delta p)dx\, dy\, dz = \frac{d\rho}{dt}dx\, dy\, dz + V(r)dx\, dy\, dz$$

$$T - V(r) = \frac{d\rho}{dt}dx\, dy\, dz$$

$\frac{d\rho}{dt}dx\, dy\, dz$ –Number of particles in the elementary volume that was changing the function of time- t change in energy of the system $(T - V(r))$.

Then, $\delta(E^{'} - E) = f(\mathrm{r})\delta(r^{'} - r) = (T - V(r))$.

$f(\mathrm{r})\delta(r^{'} - r)$, is mathematically equivalent to the known form of Lagrange equation $\frac{d}{dt}(\frac{\partial L}{\partial \dot{q}})$-$\frac{\partial L}{\partial q} = o$.

The change in position of the particles in the space was mentioned in the form of maxima and minimal function in the space. The changes in particles were described in the form of matrix and this one take care of the all wave form transformation in the space.

$$= \begin{bmatrix} e^{-il\alpha} & 0 & & 0 & \\ 0 & e^{-i(l-1)\alpha} & & 0 & \\ & & e^{-i(l-2)\alpha} & 0 & 0 \\ 0 & 0 & 0 & e^{-i(l-3)\alpha} & 0 \\ & & 0 & 0 & e^{il\alpha} \end{bmatrix}$$

Then,

$$F(r) = \frac{f(r^{'} - r)}{r^2}\begin{bmatrix} e^{-il\alpha} & 0 & & 0 & \\ 0 & e^{-i(l-1)\alpha} & & 0 & \\ & & e^{-i(l-2)\alpha} & 0 & 0 \\ 0 & 0 & 0 & e^{-i(l-3)\alpha} & 0 \\ & & 0 & 0 & e^{il\alpha} \end{bmatrix}$$

$$E(r) = \frac{f(r' - r)}{r} \begin{bmatrix} e^{-il\alpha} & 0 & & 0 & \\ 0 & e^{-i(l-1)\alpha} & & 0 & \\ & & e^{-i(l-2)\alpha} & 0 & 0 \\ 0 & 0 & 0 & e^{-i(l-3)\alpha} & 0 \\ & & 0 & 0 & e^{il\alpha} \end{bmatrix}$$

Separate two components $e^{-il\alpha}$ and $e^{il\alpha}$ then total energy of the system is,

$$E(r) = \frac{f(r' - r)e^{ikr}}{r} + \frac{f(r' - r)e^{-ikr}}{r}$$

Now we have to approach the molecular motion within the liquid coming by the collision or scattering molecules within the liquid to the applied force-F. The applied energy is e^{ikr} the total energy is summed up scattering energy of the system and interaction of the molecules within the liquid is

$$E(r) = e^{ikr} + \frac{f(r' - r)e^{ikr}}{r} + \frac{f(r' - r)e^{-ikr}}{r}$$

Here, the scattering phenomenon of the molecule is giving the driving force of the molecular motion within the liquid.

Known form of density of scattering particle is $\rho_s = \left| f(w) \frac{e^{ikr}}{r} \right|^2$

$$= \frac{1}{r^2} |f(w)|^2$$

Here small elementary area of scattering particles r. r$d\omega$ then volume element between r and r +d r=$r^2 d\omega$.

N_s –is the number of particles in the elementary volume.

$$N_s = \rho_s r^2 d\omega dr$$

$$\frac{dN_s}{dt} = |f(w)|^2 d\omega \frac{dr}{dt}$$

$$= |f(w)|^2 v\, d\omega$$

$$\frac{dN_s}{dt} = |f(w)|^2 \frac{hk}{2\pi m} \mathrm{d}\omega$$

Then comparing the scattering intensity of particle to molecular motion of the particles within the liquid,

$$T - V(r) = \frac{d\rho}{dt} dx\, dy\, dz$$

Then, fluidity could be an identified by the interaction of molecules within the liquid, on the force exertion of external influencing much to drive the molecular motion. Now, we have to classify the flow of liquid in different way, the rate of interaction of scattering cross-section of the molecules in the liquid.

$$E(r) = \mathrm{e}^{\mathrm{ikr}} + \frac{f(r' - r)\mathrm{e}^{\mathrm{ikr}}}{r} + \frac{f(r' - r)\mathrm{e}^{-\mathrm{ikr}}}{r}$$

Above mentioned equation is to give some ideas on the flow of liquid due to force interaction or collective effect of wave interactions in the space.

$$E(r) = \mathrm{e}^{\mathrm{ikr}}{}_{\mathrm{i}} = \mathrm{e}^{\mathrm{ikr}} + \frac{f(r' - r)\mathrm{e}^{\mathrm{ikr}}}{r} + \frac{f(r' - r)\mathrm{e}^{-\mathrm{ikr}}}{r}$$

The incident intensity of energy is very strongly interacted with the bounded particle they will strongly disturbed then transforming in the space for suitable velocity. The three term $\mathrm{e}^{\mathrm{ikr}}$, $\frac{f(r'-r)\mathrm{e}^{\mathrm{ikr}}}{r}$ and $\frac{f(r'-r)\mathrm{e}^{-\mathrm{ikr}}}{r}$ give the result of force of interaction of the particle and transformation in the space.

The first term $\mathrm{e}^{\mathrm{ikr}}$ is an unmodified energy therefore here the forces of incident particles are not changing the scattering particle itself.

Second term $\frac{f(r'-r)\mathrm{e}^{\mathrm{ikr}}}{r}$ is changing much the flow of liquid dynamics than the applied energy. Therefore this one consider as the flow of liquid super fluidity here like Raman Anti-stoke frequency energy level generating to the system and also here same quantum mechanism principle obeying microscopic view.

Third term $\frac{f(r'-r)e^{-ikr}}{r}$ is changing much very low the flow of liquid dynamics to the applied energy. Then this one is consider as the flow of liquid less than normal one fluidity here like Raman stoke frequency energy level generating to the system.

Flow only by not consider as the molecular level but also the electronic transition and other improper motion to help tune the matter and motion of the object in the space.

Conclusion

Mainly, here the fluidity of liquid was investigated by the law of physics atomic and molecular level apart from that the electronic inner transition is tune the much of the energy of the atomic and molecular system much for this flow in this space verified.

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