Δ² denotes the differential operator Laplacian square. It is called the biharmonic operator and plays an important role in the theory of elasticity and fluid dynamics. Given an equation
\[ \partial_t u(t, x) = -\Delta^2 u(t, x) \equiv -\partial_t^2 u(t, x), \]
t > 0, x ∈ R¹,
we easily obtain its fundamental solution
\[ p(t, x) = \frac{1}{2\pi} \int_{-\infty}^{\infty} d\xi \exp(-i\xi x - \xi^2 t), \]
t > 0, x ∈ R¹.
Following the pioneer works of Krylov [2] and Hochberg [1], we consider 'particles' whose 'transition probability density' is taken to be \( p(t, x) \) though \( p(t, x) \) is not positive. We call these 'particles' biharmonic pseudo process (or BPP in short). In this note, we shall calculate a 'distribution' of the first hitting time of BPP, and it will be proved that BPP observed at a fixed point behaves as a mixture of particles of two different types, which are 'monopoles' and 'dipoles'.

1. Given positive \( t \) and \( s \), \( p(t, x) \) is an even function in \( x \) belonging to the Schwartz class \( \mathcal{S} \), \( p(t, x) = t^{-1/4} p(1, x/t^{1/4}), \) \( \int_{-\infty}^{\infty} dx p(t, x) = 1, \) and \( \int_{-\infty}^{\infty} dy p(t, y - x) p(s, y) = p(t + s, x) \).

Note, here that values of \( p(t, x) \) may be negative. In fact, Hochberg [1] proved that
\[ p(1, |x|) = a |x|^{-1/3} \exp(-b |x|^4/3) \times \cos c |x|^{1/3} + \text{lower order term} \]
for large \( |x| \), where \( a, b, \) and \( c \) are positive constants. From the above, we see that
\[ \int_{-\infty}^{\infty} p(t, x) dx = \int_{-\infty}^{\infty} p(1, x) dx \]
as a constant \( \equiv \rho > 0 \).

Basing on this \( p(t, x) \), we can build up a finitely additive signed measure \( \mathcal{P}_x \) on cylinder sets in \( \mathbb{R}^{0, \infty} \). A cylinder set in \( \mathbb{R}^{0, \infty} \), say \( \Gamma \), is a set such that
\[ \Gamma = \{ \omega \in \mathbb{R}^{0, \infty} : \omega(t_1) \in B_1, \ldots, \omega(t_n) \in B_n \} \]
where \( 0 \leq t_1 < \cdots < t_n \) and \( B_i \)'s are Borel sets in \( \mathbb{R} \). For each cylinder set as in (4), we define a finitely additive signed measure \( \mathcal{P}_x \) by
\[ \mathcal{P}_x[\Gamma] = \int_{B_1} dy_1 \cdots \int_{B_n} dy_n p(t_1, y_1 - x) \times \]
\[ \times p(t_2 - t_1, y_1 - y_2) \cdots p(t_n - t_{n-1}, y_n - y_{n-1}). \]
Fix \( 0 \leq t_1 < \cdots < t_n \), and \( \mathcal{P}_x \) is a \( \sigma \)-additive finite measure on a Borel field on \( \mathbb{R}^n \) with total variation \( \rho^n \). We say that a function \( f \) defined on \( \mathbb{R}^{0, \infty} \) is tame, if
\[ f(\omega) = g(\omega(t_1), \ldots, \omega(t_n)), \omega \in \mathbb{R}^{0, \infty} \]
for a Borel function \( g \) on \( \mathbb{R}^n \), with \( 0 \leq t_1 < \cdots < t_n \). For each tame function \( f \) as in (6), we define its expectation in the ordinary way:
\[ E_x[f(\omega)] = \int f(\omega) d\omega(t_1) \times \cdots \times d\omega(t_n) \]
if the right hand side exists.

\( \mathcal{P}_x \) satisfies the consistency condition, but (3) disturbs validity of Kolmogorov's extension theorem. So we do not know exactly an existence of a \( \sigma \)-additive extension of (5) into a function space. But we easily see that total variation of such \( \sigma \)-additive extension must be infinite if it may exist.

2. We extend an expectation given by (7). Let \( n \) and \( N \) be natural numbers. For each \( \omega \in \mathbb{R}^{0, \infty} \), we set
\[ \omega_n(t) = \begin{cases} \omega(t) & \text{if } t < k + 1 \times \frac{2n}{2^N} \leq t < k \times \frac{2n}{2^N} \text{ and } t < N \times \frac{2n}{2^N} \text{ if } t \geq N. \end{cases} \]
This approximating function \( \omega_n \) is a step function in Skorokhod space \( D[0, \infty) \), which is a space of all right continuous functions on \([0, \infty) \) with left hand limits.

**Definition 1.** We say that a function \( F \) on \( \mathbb{R}^{0, \infty} \) is admissible if \( F \) satisfies the following:
(a) for each \( n \) and \( N \), \( F(\omega_n) \) is tame,
(b) for each \( \omega \in \mathbb{R}^{0, \infty} \), \( \lim_{n \to \infty} \lim_{N \to \infty} F(\omega_n) = F(\omega) \),
(c) there exists \( \lim_{n \to \infty} \lim_{N \to \infty} \sum_{k=1}^{N} |E_x[F(\omega_n)_k - E_x[F(\omega_n)]]| \).

For each admissible function \( F \), we define its Expectation by
\[ E_x[F(\omega)] = \lim_{n \to \infty} \lim_{N \to \infty} E_x[F(\omega_n)]. \]
If exists, this Expectation is unique owing to (c).