

Решить задачу о колебании круглой мембраны $u_{tt} = a^2 \Delta u$:

1. $a = 1$, $u(7, \varphi, t) = 0$, $u(r, \varphi, 0) = 3J_0(\mu_5 r/7)$, $u_t(r, \varphi, 0) = 5J_0(\mu_3 r/7)$.
2. $a = 2$, $u(8, \varphi, t) = 0$, $u(r, \varphi, 0) = 4J_0(\mu_6 r/8)$, $u_t(r, \varphi, 0) = 6J_0(\mu_4 r/8)$.
3. $a = 3$, $u(9, \varphi, t) = 0$, $u(r, \varphi, 0) = 5J_0(\mu_7 r/9)$, $u_t(r, \varphi, 0) = 7J_0(\mu_5 r/9)$.
4. $a = 1/2$, $u(6, \varphi, t) = 0$, $u(r, \varphi, 0) = 2J_0(\mu_8 r/6)$, $u_t(r, \varphi, 0) = 8J_0(\mu_2 r/6)$.
5. $a = 1/3$, $u(5, \varphi, t) = 0$, $u(r, \varphi, 0) = J_0(\mu_9 r/5)$, $u_t(r, \varphi, 0) = 9J_0(\mu_1 r/5)$.
6. $a = 2$, $u(4, \varphi, t) = 0$, $u(r, \varphi, 0) = 6J_0(\mu_8 r/4)$, $u_t(r, \varphi, 0) = 8J_0(\mu_6 r/4)$.
7. $a = 3$, $u(1, \varphi, t) = 0$, $u(r, \varphi, 0) = 7J_0(\mu_9 r)$, $u_t(r, \varphi, 0) = 9J_0(\mu_7 r)$.
8. $a = 1/2$, $u(2, \varphi, t) = 0$, $u(r, \varphi, 0) = 4J_0(\mu_6 r/2)$, $u_t(r, \varphi, 0) = 6J_0(\mu_4 r/2)$.
9. $a = 1/3$, $u(3, \varphi, t) = 0$, $u(r, \varphi, 0) = 5J_0(\mu_9 r/3)$, $u_t(r, \varphi, 0) = 9J_0(\mu_5 r/3)$.
10. $a = 1$, $u(6, \varphi, t) = 0$, $u(r, \varphi, 0) = 2J_0(\mu_4 r/6)$, $u_t(r, \varphi, 0) = 4J_0(\mu_2 r/6)$.
11. $a = 1$, $u(7, \varphi, t) = 0$, $u(r, \varphi, 0) = 5J_0(\mu_3 r/7)$, $u_t(r, \varphi, 0) = 3J_0(\mu_5 r/7)$.
12. $a = 2$, $u(8, \varphi, t) = 0$, $u(r, \varphi, 0) = 6J_0(\mu_4 r/8)$, $u_t(r, \varphi, 0) = 4J_0(\mu_6 r/8)$.
13. $a = 3$, $u(9, \varphi, t) = 0$, $u(r, \varphi, 0) = 7J_0(\mu_5 r/9)$, $u_t(r, \varphi, 0) = 5J_0(\mu_7 r/9)$.
14. $a = 1/2$, $u(6, \varphi, t) = 0$, $u(r, \varphi, 0) = 8J_0(\mu_2 r/6)$, $u_t(r, \varphi, 0) = 2J_0(\mu_8 r/6)$.
15. $a = 1/3$, $u(5, \varphi, t) = 0$, $u(r, \varphi, 0) = 9J_0(\mu_1 r/5)$, $u_t(r, \varphi, 0) = J_0(\mu_9 r/5)$.
16. $a = 2$, $u(4, \varphi, t) = 0$, $u(r, \varphi, 0) = 8J_0(\mu_6 r/4)$, $u_t(r, \varphi, 0) = 6J_0(\mu_8 r/4)$.
17. $a = 3$, $u(1, \varphi, t) = 0$, $u(r, \varphi, 0) = 9J_0(\mu_7 r)$, $u_t(r, \varphi, 0) = 7J_0(\mu_9 r)$.
18. $a = 1/2$, $u(2, \varphi, t) = 0$, $u(r, \varphi, 0) = 6J_0(\mu_4 r/2)$, $u_t(r, \varphi, 0) = 4J_0(\mu_6 r/2)$.
19. $a = 1/3$, $u(3, \varphi, t) = 0$, $u(r, \varphi, 0) = 9J_0(\mu_5 r/3)$, $u_t(r, \varphi, 0) = 5J_0(\mu_9 r/3)$.
20. $a = 1$, $u(6, \varphi, t) = 0$, $u(r, \varphi, 0) = 4J_0(\mu_2 r/6)$, $u_t(r, \varphi, 0) = 2J_0(\mu_4 r/6)$.

(где μ_k – k -ый корень функции Бесселя нулевого порядка: $J_0(\mu_k) = 0$)