I first define the terms in Eq. A13 and Eq. A14 which are also in Eq. A16, as well.

$$term\_1 := \frac{x\_0^2}{(x\_0 \cdot \mathrm{HankelH1}(2, x\_0) + \mathrm{HankelH1}(1, x\_0))};$$

$$\frac{x\_0^2}{x\_0\,\mathrm{HankelH1}(2, x\_0) + \mathrm{HankelH1}(1, x\_0)} \tag{1}$$

$$term\_2 := \frac{x\_0}{\mathrm{HankelH1}(1, x\_0)};$$

$$\frac{x\_0}{\mathrm{HankelH1}(1, x\_0)} \tag{2}$$

Then I define the terms other than term_1 and term_2 and integrate them as they are in Eq. A12.

$$const := \frac{B\_0}{2 \cdot x} \cdot \sin(a) \cdot \exp(I \cdot (x + etha));$$

$$\frac{1}{2}\,\frac{B\_0 \sin(a)\, \mathrm{e}^{\mathrm{I}(x+etha)}}{x} \tag{3}$$

$$B\_theta := I \cdot const \cdot (term\_1 - term\_2) \cdot \cos(a);$$

$$\frac{1}{x}\left(\frac{1}{2}\,\mathrm{I}\,B\_0 \sin(a)\, \mathrm{e}^{\mathrm{I}(x+etha)} \left(\frac{x\_0^2}{x\_0\,\mathrm{HankelH1}(2, x\_0) + \mathrm{HankelH1}(1, x\_0)} - \frac{x\_0}{\mathrm{HankelH1}(1, x\_0)}\right) \cos(a)\right) \tag{4}$$

$$B\_phi := -const \cdot (term\_1 \cdot \cos(2 \cdot a) - term\_2);$$

$$-\frac{1}{2}\,\frac{1}{x}\left(B\_0 \sin(a)\, \mathrm{e}^{\mathrm{I}(x+etha)} \left(\frac{x\_0^2 \cos(2\,a)}{x\_0\,\mathrm{HankelH1}(2, x\_0) + \mathrm{HankelH1}(1, x\_0)} - \frac{x\_0}{\mathrm{HankelH1}(1, x\_0)}\right)\right) \tag{5}$$

$$const2 := \frac{eps\_0 \cdot c^4 \cdot x^2}{w^2};$$

$$\frac{eps\_0\, c^4\, x^2}{w^2} \tag{6}$$

$$In \cdot w \cdot wdot = const2 \cdot 2 \cdot \mathrm{Pi} \cdot int\left(\left(B\_theta^2 + B\_phi^2\right) \cdot \sin(a),\ a = 0\,..\mathrm{Pi}\right)$$

(I haven't execute the line above because it turns into a weird formula with all of the constants etc. It is written below, part by part.)

Then, without the constants, the integral turns into this form:

$$term := (t1 \cos(2\,a) - t2)^2 + (t1 - t2)^2 \cos(a)^2;$$

$$(t1 \cos(2\,a) - t2)^2 + (t1 - t2)^2 \cos(a)^2 \tag{7}$$

$$\mathrm{term3} := term \cdot \sin(a);$$

$$\left((t1 \cos(2\,a) - t2)^2 + (t1 - t2)^2 \cos(a)^2\right) \sin(a) \tag{8}$$

$int(c \cdot \mathrm{term3}, a = 0 ..\mathrm{Pi});$

$$\frac{8}{15}\, c\, (3\, t1^2 + 5\, t2^2) \tag{9}$$

Since t*z is a higher order term, we can neglect it. Then, our equation would become:

$In \cdot w \cdot wdot = \frac{4 \cdot \mathrm{pi} \cdot B\_0^2 \cdot r\_0^6 \cdot w^4 \sin(a)^2}{mu\_0 \cdot c^3} \cdot \frac{1}{x\_0^6} \left(\frac{1}{3} term\_1 + \frac{1}{5} term\_2 \right);$

$$In\, w\, wdot = \frac{1}{mu\_0\, c^3\, x\_0^6} \Bigg(4\, \pi\, B\_0^2\, r\_0^6\, w^4 \sin(a)^2 \bigg(\frac{1}{3}\, 1 \big/ (x\_0\, \mathrm{HankelH1}(2, x\_0) + \mathrm{HankelH1}(1, x\_0))x\_0^2 + \frac{1}{5}\, \frac{x\_0}{\mathrm{HankelH1}(1, x\_0)} \bigg) \Bigg) \tag{10}$$

Here the problem comes: in the paper (Melatos '97) the part with Hankel functions in paranthesis with the denominator 1/x_0^6 turns into a polynomial statement as:

$$\frac{1}{x\_0^6} \cdot \left[\frac{1}{3 \cdot (x\_0^2 + 1)} + \frac{x\_0^4}{5 \cdot (x\_0^6 - 3 \cdot x\_0^4 + 36)} \right]$$