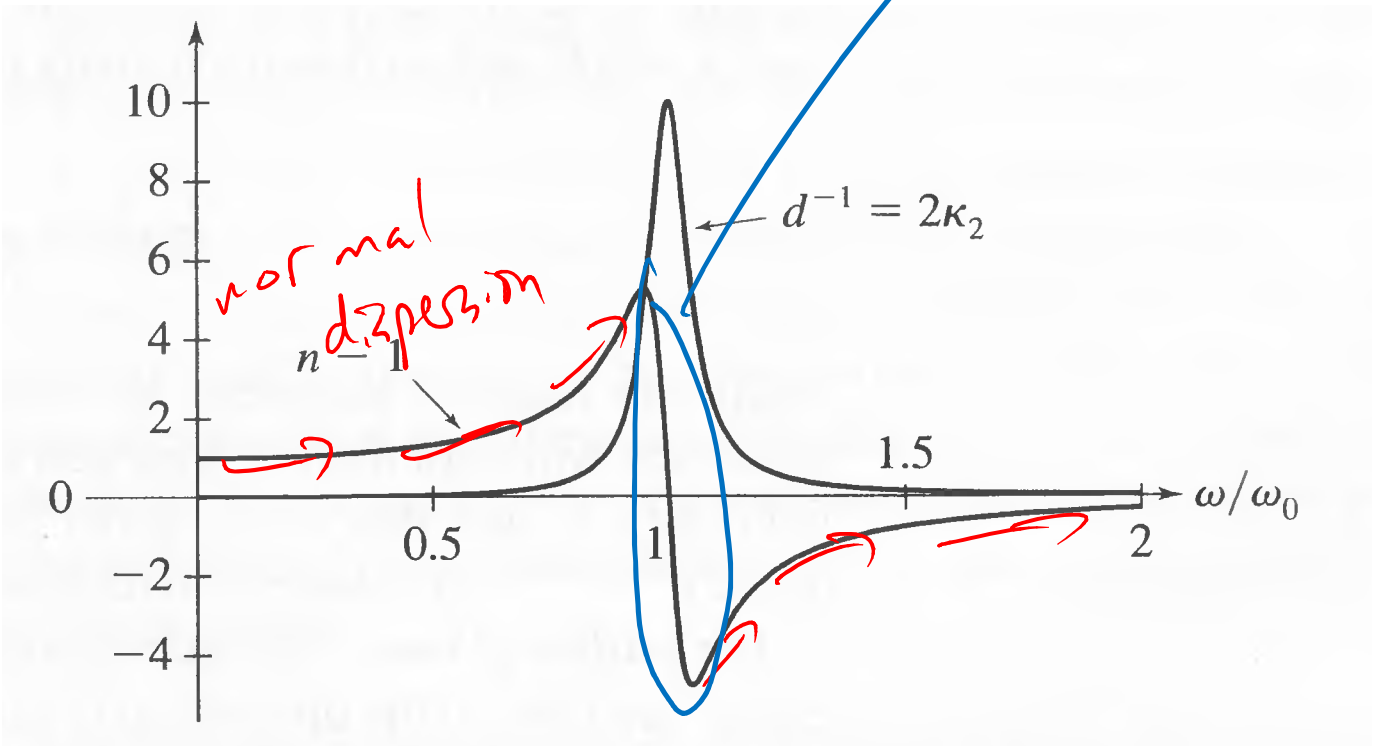
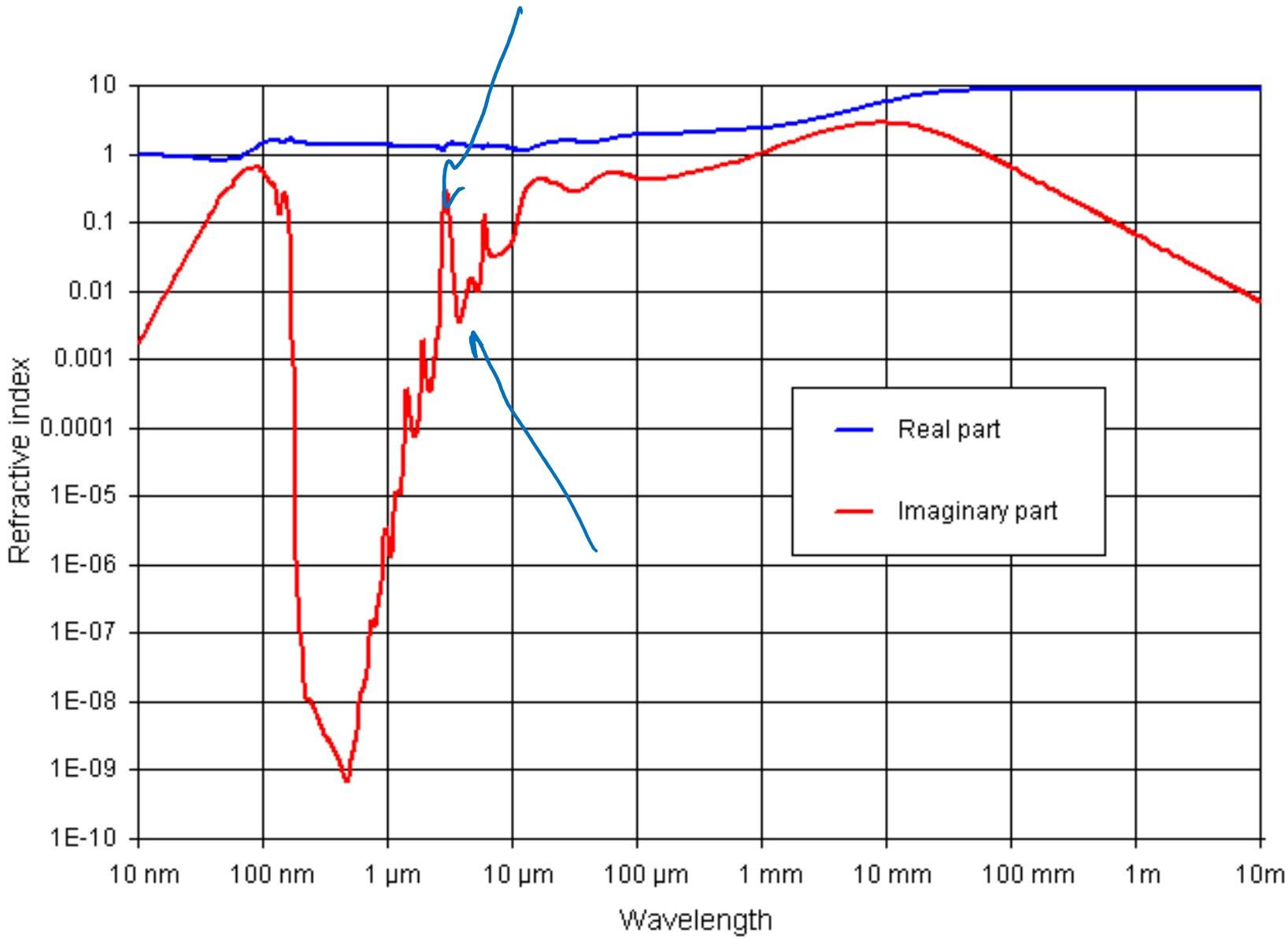
Physically, what do you suppose provides the damping term in our equation of motion?

$$m\frac{d^2\vec{x}}{dt^2} = -K\vec{x} - \gamma\frac{d\vec{x}}{dt} - e\vec{E}e^{-i\omega t}$$


anomalous dispersion
normal dispersion
$d^{-1} = 2\kappa_2$
$n - 1$
10
8
6
4
2
0
−2
−4
0.5
1
1.5
2
ω/ω_0


10
1
0.1
0.01
0.001
0.0001
1E-05
1E-06
1E-07
1E-08
1E-09
1E-10
Refractive index
10 nm
100 nm
1 µm
10 µm
100 µm
1 mm
10 mm
100 mm
1m
10m
Wavelength
Real part
Imaginary part

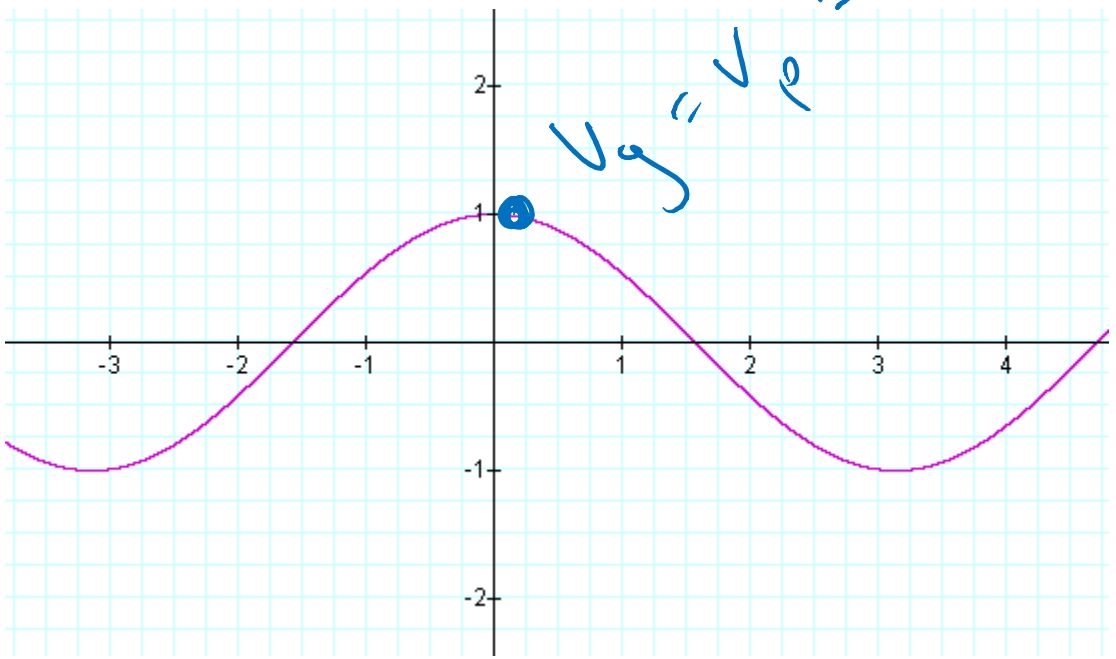
Consider this happy little electromagnetic wave.
Can the wave crests ever move faster than c?

A) Yes

B) No

C) Maybe

D) It's a trap!



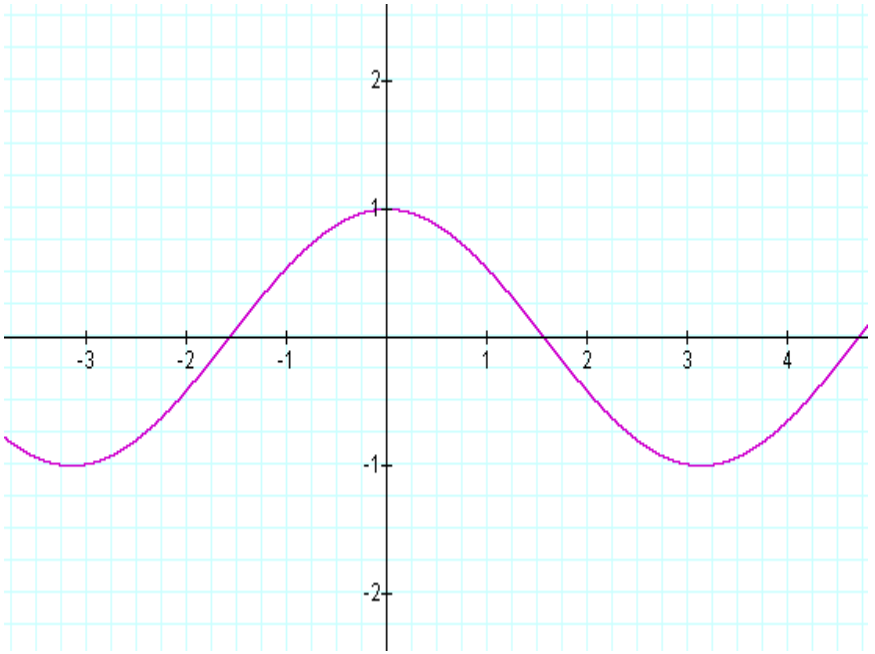
If we have a plane wave, how should the group velocity and phase velocity be related?

A) $v_g = v_p$

B) $v_g > v_p$

C) $v_g < v_p$

D) No guaranteed relation



We have here a wave packet described by

$$Sin(x - ct) \cdot e^{(x-ct)^2}$$

How many frequency components does this beast have?

A) One

B) Two

C) N, N>2

D) Countably infinite

E) Uncountably infinite