

The Story of the Standing Waves:

Once upon a time in a coaxial line far, far away, there was a radio station with two bent dipole antennas. These dipole antennas were attached on either side of a laaarrge and very sturdy coaxial transmission line. This transmission line carried very large (kW!) sinusoidal waves, and everyone knows that sinusoidal waves like to reflect off of any change in impedance they run into! But these dipole antennas were so well matched to the transmission line, that the sinusoidal waves were very well behaved. They hardly saw any impedance mismatch at all, and so they didn't reflect (at least not very much ☺). The standing wave inside the coaxial transmission line was very small, and most of the power simply radiated out of the dipole antennas, as every good engineer would hope it would.



And then one day the wind blew. And it blew, and it blew, and it blew. And one of the dipole antennas broke off of the coaxial line and fell to the ground. Suddenly the surprised sinusoidal waves ran into the broken end of the transmission line ... They teetered precariously on the edge of that horrible precipice. But instead of falling off into oblivion, the sinusoidal waves turned back around and RACED back towards their source. No sooner did they turn around, than they ran right up against more waves headed towards the abyss. No way were the returning sinusoidal waves going to get swept back

towards that edge! No-sirrreee. Those smart kW waves stepped right up and over the waves that were in their way, reaching dizzying heights never before attempted in the coaxial transmission line.

But somehow, things were not going quite as the sinusoidal waves had imagined. Things were getting a little bit warm. In fact, things were really getting mighty hot in there! The running feet of all of those sinusoidal waves had rubbed so hard and fast on the inner conductor of the coax, that it began to melt down. In one huge BANG and FLASH! The inner conductor of the transmission line melted down, and the huge current it generated popped the breaker of the radio station, bringing all of the standing waves to their knees....



And forever more afterwards, the students in ECE3300 REMEMBERED that standing waves are not purely mathematical formulations done for homework and exams. These students REMEMBERED that standing waves can melt things, and they never ever in their careers turned on the power on an RF device without first being absolutely certain that it was well matched, or that it was strong enough to withstand the standing waves that they were inevitably producing.



