Sail Trim for Cruisers

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Maryland School of Sailing and Seamanship

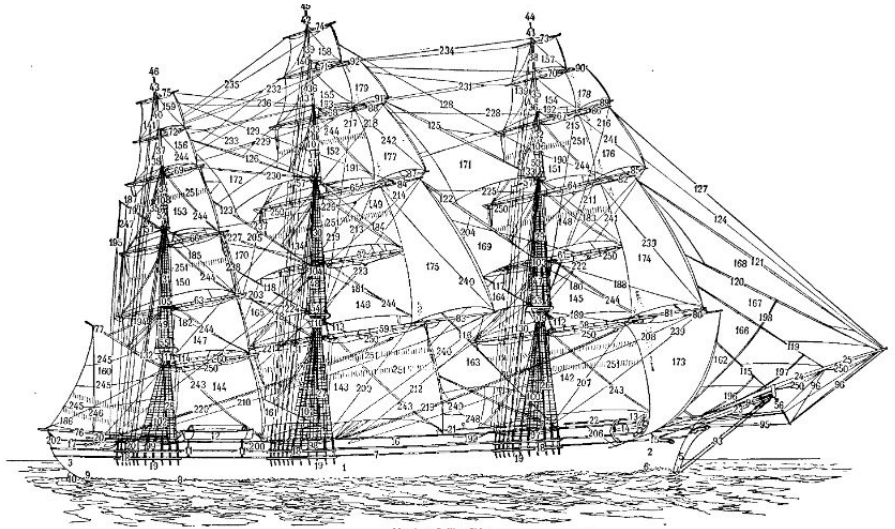
All The Ropes (Yes, I *know* they are not ropes)

The biggies

- Halyard
- Sheet
- Vang
- Traveller

The controls

- Outhaul
- Downhaul
- Cunningham
- Leech Line



Merchant Sailing Ship.

1, hull; 2, bow; 3, stern; 4, cutwater; 5, stem; 6, entrance; 7, waist; 8, run; 9, counter; 10, rudder; 11, davits; 12, quarter-boat; 13, cathead; 14, anchor; 15, cable; 16, bulwarks; 17, taffrail; 18, channels; 19, chain-plates; 20, cabin-trunk; 21, after deck-house; 22, forward deck-house; 23, bowsprit; 24, jib-boom; 25, flying-jib boom; 26, foremast; 27, mainmast; 28, mizzenmast; 29, foretopmast; 30, maintopmast; 31, mizzentopmast; 32, foretopgallantmast; 33, maintopgallantmast; 34, mizzentopgallantmast; 35, foreroyalmast; 36, mainroyalmast; 37, mizzenroyalmast; 38, foreskysailmast; 39, mainskysailmast; 40, mizzenskysailmast; 41, foreskysail-pole; 42, mainskysail-pole; 43, mizzenskysail-pole; 44, fore-truck; 45, main-truck; 46, mizzen-truck; 47, foremast-head; 48, mainmast-head; 49, mizzenmast-head; 50, foretopmast-head; 51, maintopmast-head; 52, mizzentopmast-head; 53, foretop; 54, maintop; 55, mizzentop; 56, dolphin-striker; 57, outriggers; 58, foreyard; 59, mainyard; 60, crossjack-yard; 61, fore lower topsail-yard; 62, main lower topsail-yard; 63, mizzen lower topsail-yard; 64, fore upper topsail-yard; 65, main upper topsail-yard; 66, mizzen upper topsail-yard; 67, foretopgallant-yard; 68, maintopgallant-yard; 69, mizzentopgallant-yard; 70, foreroyal-yard; 71, mainroyal-yard; 72, mizzenroyal-yard; 73, foreskysail-yard; 74, mainskysail-yard; 75, mizzenskysail-yard; 76, spanker-boom; 77, spanker-gaff; 78, mainstaysail-gaff; 79, cockey-gaff; 80, lower studdingsail-yard; 81, foretopmast studdingsail-boom; 82, foretopmast studdingsail-yard; 83, maintopmast studdingsail-boom; 84, maintopmast studdingsail-yard; 85, foretopgallant studdingsail-boom; 86, foretopgallant studdingsail-yard; 87, maintopgallant studdingsail-boom; 88, maintopgallant studdingsail-yard; 89, foreroyal studdingsail-boom; 90, foreroyal studdingsail-yard; 91, mainroyal studdingsail-boom; 92, mainroyal studdingsail-yard; 93, bolsters; 94, bowsprit-shrouds; 95, martingale-guys; 96, martingale stays; 97, forechains; 98, main-chains; 99, mizzen-chains; 100, fore-shrouds; 101, main-shrouds; 102, mizzen-shrouds; 103, foretopmast-shrouds; 104, maintopmast shrouds; 105, mizzentopmast-shrouds; 106, foretopgallant-shrouds; 107, maintopgallant-shrouds; 108, mizzentopgallant-shrouds; 109, futtock-shrouds; 110, futtock-shrouds; 111, futtock-shrouds; 112, forestay; 113, mainstay; 114, mizzenstay; 115, foretopmast-stay; 116, maintopmast-stay; 117, spring-stay; 118, mizzentopmast-stay; 119, jib-stay; 120, flying-jib stay; 121, foretopgallant-stay; 122, maintopgallant stay; 123, mizzentopgallant stay; 124, foreroyal-stay; 125, mainroyal-stay; 126, mizzenroyal-stay; 127, foreskysail-stay; 128, mainskysail-stay; 129, mizzenskysail-way; 130, foretopmast-backstays; 131, maintopmast-backstays; 132, mizzentopmast-backstays; 133, foretopgallant-backstays; 134, maintopgallant-backstays; 135, mizzentopgallant-backstays; 136, foreroyal-backstays; 137, mainroyal-backstays; 138, mizzenroyal-backstays; 139, foreskysail-backstays; 140, mainskysail-backstays; 141, mizzenskysail-backstays; 142, foresail or forecourse; 143, mainsail or maincourse; 144, cross-jack; 145, fore lower topsail; 146, main lower topsail; 147, mizzen lower topsail; 148, fore upper topsail; 149, main upper topsail; 150, mizzen upper toisail; 151, foretopgallant-sail; 152, maintopgallant-sail; 153, mizzentopgallant-sail; 154, foreroyal; 155, mainroyal; 156, mizzenroyal; 157, foreskysail; 158, mainskysail; 159, mizzenskysail; 160, spanker; 161, mizzenstaysail; 162, foretopmast-staysail; 163, maintopmast lower staysail; 164, maintopmast upper staysail; 165, mizzentopmast-staysail; 166, jib; 167, flying jib; 168, jib-topsail; 169, maintopgallant-staysail; 170, mizzentopgallant-staysail; 171, mainroyal-staysail; 172, mizzenroyal-staysail; 173, lower studdingsail; 174, foretopmast-studdingsail; 175, maintopmast-studdingsail; 176, foretopgallant-studdingsail; 177, maintopgallant-studdingsail; 178, foreroyal-studdingsail; 179, mainroyal-studdingsail; 180, forelift; 181, mainlift; 182, crossjack-lift; 183, fore lower topsail-lift; 184, main lower topsail-lift; 185, mizzen lower topsail-lift; 186, spanker-boom topping-lift; 187, cockey-gaff lift; 188, lower studdingsail-halyards; 189, lower studdingsail inner halyards; 190, foretopmast studdingsail-halyards; 191, maintopmast studdingsail-halyards; 192, foretopgallant studdingsail-halyards; 193, maintopgallant studdingsail-halyards; 194, spanker peak-halyards; 195, signal-halyards; 196, weather jib-sheet; 197, weather flying-jib sheet; 198, weather jib top-sheet; 199, weather fore sheet; 200, weather main-sheet; 201, weather crossjack-sheet; 202, spanker-sheet; 203, mizzentopgallant staysail-sheet; 204, mainroyal staysail-sheet; 205, mizzenroyal staysail-sheet; 206, lower studdingsail-sheet; 207, foretopmast studdingsail-sheet; 208, foretopmast studdingsail-tack; 209, maintopmast studdingsail-sheet; 210, maintopmast studdingsail-tack; 211, foretopgallant studdingsail-sheet; 212, foretopgallant studdingsail-tack; 213, maintopgallant studdingsail-sheet; 214, maintopgallant studdingsail-tack; 215, foreroyal studdingsail-sheet; 216, foreroyal studdingsail-tack; 217, mainroyal studdingsail-sheet; 218, mainroyal studdingsail-tack; 219, forebrace; 220, mainbrace; 221, crossjack-brace; 222, fore lower topsail-brace; 223, main lower topsail-brace; 224, mizzen lower topsail-brace; 225, fore upper topsail-brace; 226, main upper topsail-brace; 227, mizzen upper topsail brace; 228, foretopgallant brace; 229, maintopgallant-brace; 230, mizzentopgallant-brace; 231, foreroyal-brace; 232, mainroyal-brace; 233, mizzenroyal-brace; 234, foreskysail-brace; 235, mainskysail-brace; 236, mizzenskysail-brace; 237, upper maintopsail-downhaul; 238, upper mizzentopsail-downhaul; 239, foretopmast studdingsail-downhaul; 240, maintopmast studdingsail-downhaul; 241, foretopgallant studdingsail-downhaul; 242, maintopgallant studdingsail-downhaul; 243, clue-garnets; 244, clue-lines; 245, spanker-brails; 246, spanker-gaff vangs; 247, ieonkey-gaff vangs; 248, main bowline; 249, bowline-bridle; 250, foot-ropes; 251, reef-points.

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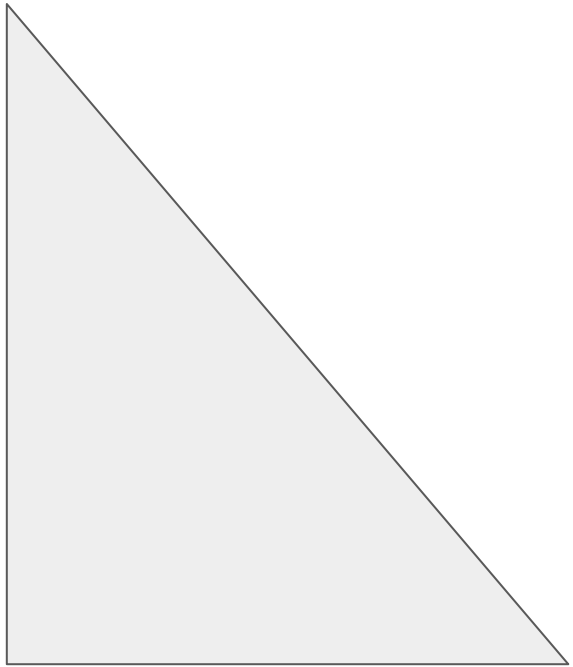
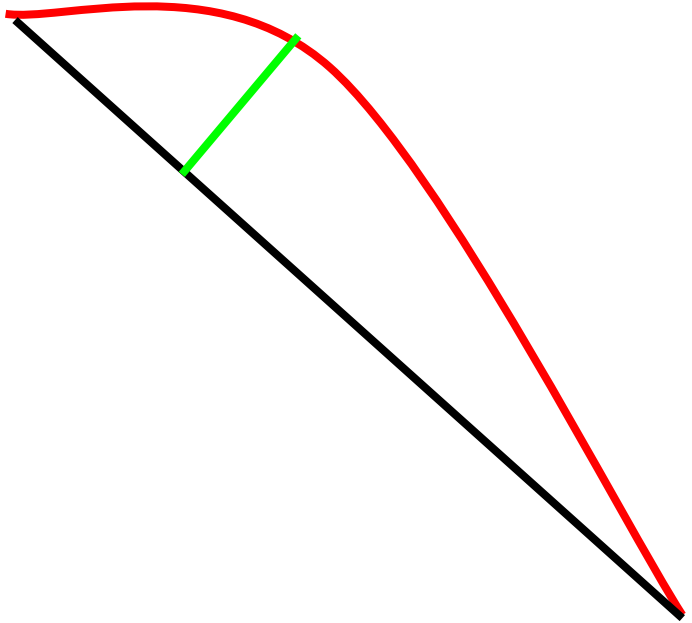


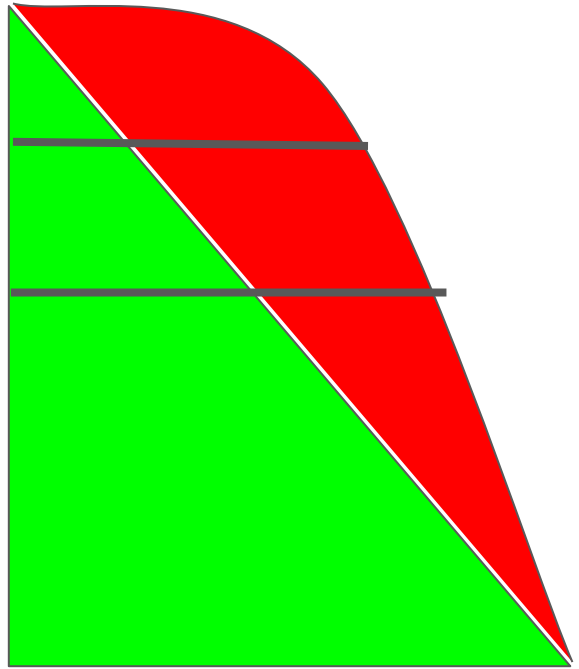
Sail Shape

- Camber - ratio of depth to chord length
- Draft - point of maximum camber



Sail Shape

- Roach - extension of sail beyond the natural leech
- Battens - support the roach and defines the draft



Sail Shape

- Cut - the relationship of the sail panels to each other
- Entry and Exit angle - the difference between the angle of the sail and the angle of the apparent wind
- Twist - the difference between the exit angle at the bottom of a sail and the top

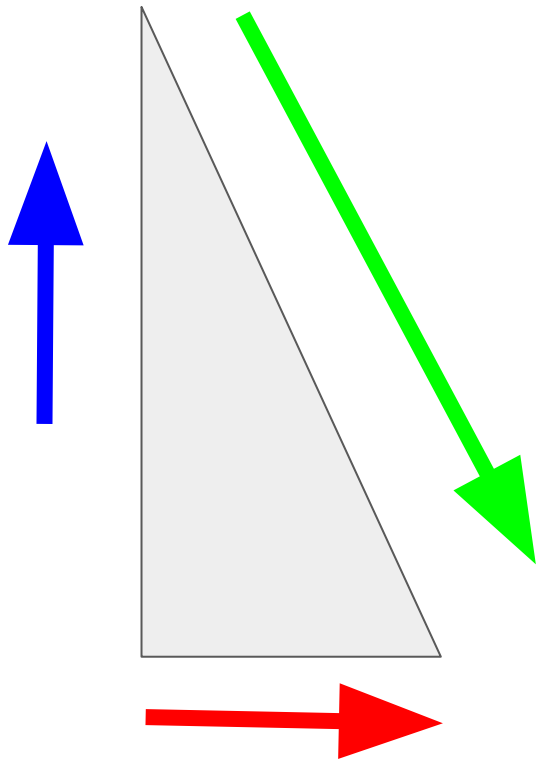
Wind Speed

Wind Speed varies with Height above the water

- Wind close to the surface has a frictional attraction to the water
- This is what causes waves to start
- As height increases, wind speed increases (technically, it is the other way around)
- A 25 knot wind at the top of a 50 foot mast would be about 23.7 knots at the 33 foot level (standard “surface” speed) and about 18 knots at 3 feet
- There are a ***lot*** of variables at play here

Angle of Attack is Different at Different Mast Heights

- As wind speed changes, Angle of the wind changes
- Apparent wind = True Wind +/- Boat Speed
- For a given boat speed, Apparent Wind will change as true wind changes
- Since Apparent Wind is a vector force, changes in true wind speed causes changes in apparent wind speed and direction



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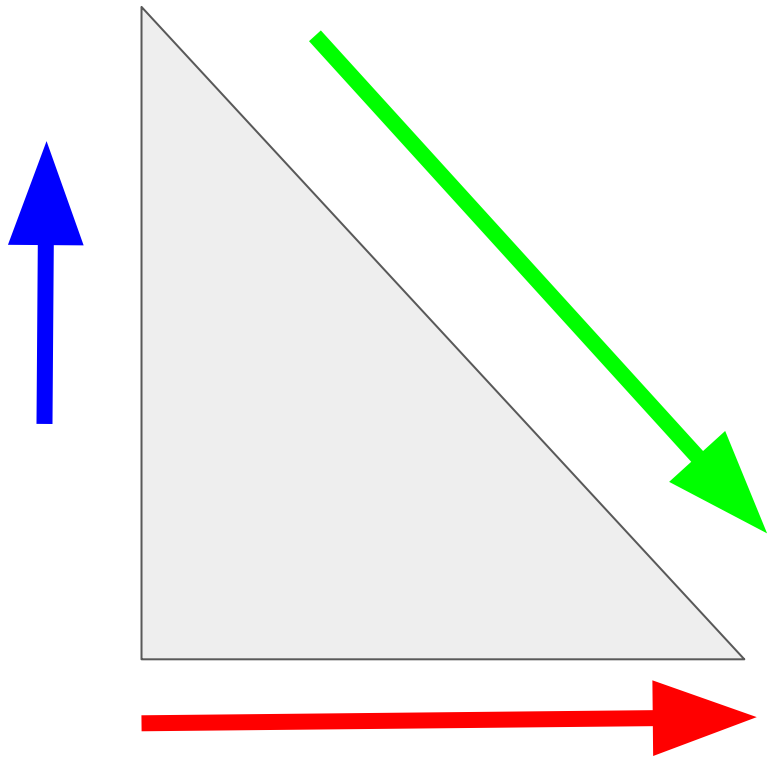

Controlling Angle of Attack with the Main Sheet

- Beginning sailors usually get taught to control AoA with the Mainsheet
  - Beginning sailors usually get taught on small boats where twist is not an issue
  - Small boats generally don’t have travellers
- Once you get to a big boat, AoA changes get larger
- The twist in a sail is controlled by Boom Horizontal Angle
- BHA is controlled by the Mainsail and/or the Vang
- Vang does not generally have enough power to change BHA
- Adjust Mainsheet to adjust twist, then set Vang to match
- If using Mainsheet to control twist, use Traveller to control AoA

Downwind Sailing on the Main

- Once we get past the end of the traveller, the Mainsheet changes length
- At this point, twist is controlled by the Vang
- Angle of Attack is controlled by the Mainsheet and the Preventer
- The difference between upwind sailing and downwind sailing is easy
    - Is the AoA controlled by the Mainsheet or the Traveller?
- We steer the boat under the wind, not the other way around

Headsail Vs Mainsail

- Finer entry angle
- Twist affects the luff more than the leech
- Exit Angle dependant on the geneo track
- Angle of Attack for Genoa is restricted by the Spreaders
- Upwind sailing is more affected by the headsail than the mainsail
- Headsail AoA defines Mainsail AoA
- Barber Hauler
- Roller furling kills entry angle, but reduces twist issues
-

Aspect Ratio

- The ratio of the height of the sail to its foot
- High Aspect
  - Tall, thin sail
  - Gets more sail material into the “clean” upper wind
  - Better for upwind sailing, less drag per area
  - Requires more active management and moves stress higher up the mast
- Low Aspect
  - Short, long sail
  - More power close to the boat, lower center of effort
  - Requires longer boom, so more danger to crew

Questions?

- www.mdschool.net
- (410) 778-5363