Scientific usage of the Pencil Code

Search results using `http://adslabs.org` and
Bumblebee `https://ui.adsabs.harvard.edu/`

`http://pencil-code.nordita.org/highlights/`
June 30, 2020

A search using ADS `https://ui.adsabs.harvard.edu/` lists the papers in which the Pencil Code is being quoted. In the following we present the papers that are making use of the code either for their own scientific work of those authors, or for code comparison purposes. We include conference proceedings, which make up 15–20% of all papers. We classify the references by year and by topic, although the topics are often overlapping. The primary application of the Pencil Code lies in astrophysics, in which case we classify the papers mostly by the field of research. Additional applications can also be found in meteorology and combustion.

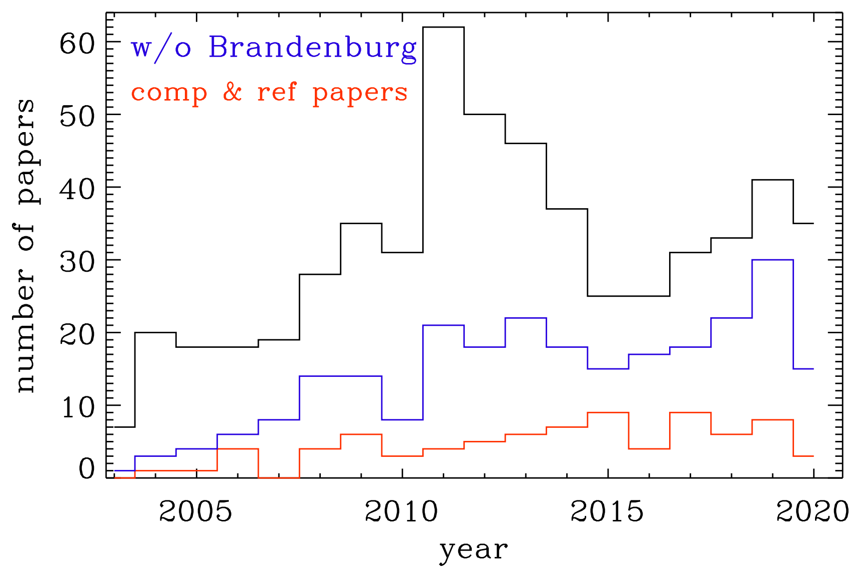

Figure 1: Number of papers since 2003 that make use of the Pencil Code. In red is shown the number of papers that reference it for code comparison or other purposes and in blue the papers that are not co-authored by Brandenburg. The enhanced number of papers during 2011–2013 results from publications related to his ERC Advanced Grant.

1 Papers by year

As of June 2020, the Pencil Code *has been used for a total of 561 research papers; see Figure 1; 254 of those are papers (45%) are not co-authored by Brandenburg. In addition, 80 papers reference it for code comparison or other purposes (see the red line).*

35 times in 2020 (Zhang et al., 2020; Pusztai et al., 2020; Brandenburg, 2020a,b; Viviani and Käpylä, 2020; Jakab and Brandenburg, 2020; Li and Mattsson, 2020; Adrover-González and

Terradas, 2020; Brandenburg and Brüggen, 2020; Brandenburg and Furuya, 2020; Gerbig et al., 2020; Schober et al., 2020b; Santos-Lima et al., 2020; Brandenburg et al., 2020b; Seta et al., 2020; Brandenburg and Boldyrev, 2020; Bhatnagar, 2020; Eriksson et al., 2020; Käpylä et al., 2020a,b; Aarnes et al., 2020; Qian et al., 2020; Gent et al., 2020; Schober et al., 2020a; Roper Pol et al., 2020; Brandenburg and Das, 2020; Singh et al., 2020; Chatterjee, 2020; Bourdin, 2020; Warnecke and Bingert, 2020; Brandenburg and Chen, 2020; Navarrete et al., 2020; Li et al., 2020; Brandenburg and Scannapieco, 2020; Kahniashvili et al., 2020),

41 times in 2019 (Hofer and Bourdin, 2019; Evirgen and Gent, 2019; Park, 2019a,b; Rüdiger et al., 2019b,a; Gerbig et al., 2019; Warnecke and Peter, 2019b,a; Käpylä, 2019; Roper Pol et al., 2019; Evirgen et al., 2019; Peng et al., 2019; Viviani et al., 2019; Bhat et al., 2019; Nauman and Nättilä, 2019; Castrejon et al., 2019; Navarrete et al., 2019; Candelaresi et al., 2019; Baehr and Klahr, 2019; Rodrigues et al., 2019; Hernandez et al., 2019; Li et al., 2019; Aarnes et al., 2019; Smiet et al., 2019; Brandenburg et al., 2019b,a; Brandenburg and Rempel, 2019; Käpylä et al., 2019; Mattsson et al., 2019a,b; Losada et al., 2019; Seta and Beck, 2019; Rempel et al., 2019; Manser et al., 2019; Yang and Zhu, 2020; Mao et al., 2019; Hedvall and Mattsson, 2019; Schober et al., 2019; Brandenburg, 2019a,b),

33 times in 2018 (Käpylä et al., 2018; Väisälä et al., 2018; Warnecke, 2018; Warnecke et al., 2018; Li et al., 2018b,c; Schober et al., 2018; Käpylä, 2018; McNally et al., 2018; Zhang et al., 2018b; Schaffer et al., 2018; Lyra et al., 2018; Brandenburg and Oughton, 2018; Yang et al., 2018; Trivedi et al., 2018; Viviani et al., 2018; Bhatnagar et al., 2018b,a; Schreiber and Klahr, 2018; Bushby et al., 2018; Zhang and Yan, 2018; Bourdin and Brandenburg, 2018; Brandenburg et al., 2018a,b; Bourdin et al., 2018; Korsós et al., 2018; Rice and Nayakshin, 2018; Richert et al., 2018; Mitra et al., 2018; Brandenburg and Chatterjee, 2018; Kuchner et al., 2018; Perri and Brandenburg, 2018; Brandenburg, 2018),

31 times in 2017 (Bourdin, 2017; Yang et al., 2017; Bhat et al., 2017; Kahniashvili et al., 2017; Aarnes et al., 2017; Hollins et al., 2017; Reppin and Banerjee, 2017; Singh et al., 2017; Hord et al., 2017; Lyra et al., 2017; Baehr et al., 2017; Park, 2017; Sharma et al., 2017; Brandenburg and Kahniashvili, 2017; Käpylä et al., 2017a,b; Haugen et al., 2017; Gent et al., 2017; Osano and Adams, 2017; Cameron et al., 2017; Pekkilä et al., 2017; Brandenburg et al., 2017a,b,c,d,e; Aiyer et al., 2017; Li et al., 2017; Jabbari et al., 2017; Rempel et al., 2017; Smiet et al., 2017),

24 times in 2016 (Chatterjee et al., 2016; Chamandy, 2016; Chamandy et al., 2016; Candelaresi et al., 2016; Bhat et al., 2016a; Adams and Osano, 2016; Osano and Adams, 2016a,b; Krüger et al., 2016; Bhat et al., 2016b; Yang and Johansen, 2016; Cole et al., 2016; Kahniashvili et al., 2016; Warnecke et al., 2016; Jabbari et al., 2016; Lambrechts et al., 2016; Bourdin et al., 2016; Threlfall et al., 2016; Bhat and Brandenburg, 2016; Tian and Chen,

2016; Rodrigues et al., 2016; Lyra et al., 2016; Karak and Brandenburg, 2016; Yokoi and Brandenburg, 2016),

25 times in 2015 (Bourdin et al., 2015; Singh and Jingade, 2015; Jabbari et al., 2015; Jabbari, 2015; Chen et al., 2015; Johansen et al., 2015; Richert et al., 2015; Park and Park, 2015; Park, 2015; Smiet et al., 2015; Carrera et al., 2015; Gibbons et al., 2015; Baehr and Klahr, 2015; Snellman et al., 2015; Babkovskaia et al., 2015; Raettig et al., 2015; Andrievsky et al., 2015; Carrera et al., 2015; Chaudhuri, 2015; Singh et al., 2015; Lyra et al., 2015; Karak et al., 2015a,b; Brandenburg and Hubbard, 2015; Brandenburg et al., 2015),

37 times in 2014 (Bourdin, 2014; Bourdin et al., 2014; Carrera et al., 2014; Yang and Johansen, 2014a; Adams and Osano, 2014; Yang and Johansen, 2014b; Subramanian and Brandenburg, 2014; Singh et al., 2014; Jabbari and Brandenburg, 2014; Jabbari et al., 2014; Karak et al., 2014; Warnecke et al., 2014; McNally et al., 2014; Brandenburg et al., 2014; Gibbons et al., 2014; Pan and Padoan, 2014; Pan et al., 2014a,b; Lyra, 2014; Bhat et al., 2014; Losada et al., 2014; Rheinhardt et al., 2014; Mitra et al., 2014; Turner et al., 2014; Dittrich et al., 2014; Brandenburg and Stepanov, 2014; Chian et al., 2014; Brandenburg, 2014; Park, 2014b,a; Käpylä et al., 2014; Modestov et al., 2014; Cole et al., 2014; Rüdiger and Brandenburg, 2014; Warnecke and Brandenburg, 2014; Barekat and Brandenburg, 2014; Väisälä et al., 2014),

46 times in 2013 (Lyra and Kuchner, 2013; Bourdin et al., 2013a,b; Félix et al., 2013; Hubbard, 2013; Park et al., 2013; Park, 2013a,b; Getling, 2013; Devlen et al., 2013; Gent et al., 2013a,b; Brandenburg and Lazarian, 2013; Pan and Padoan, 2013; Mitra et al., 2013; van Wettum et al., 2013; Candelaresi and Brandenburg, 2013a,b; Kahniashvili et al., 2013; Lyra, 2013; Bhat and Subramanian, 2013; Raettig et al., 2013; Del Sordo et al., 2013; Chamandy et al., 2013; Di Bernardo and Torkelsson, 2013; Jabbari et al., 2013; Dittrich et al., 2013; Bingert and Peter, 2013; Brandenburg and Rädler, 2013; Bykov et al., 2013; Brandenburg, 2013; Warnecke et al., 2013a,b,c; Rempel et al., 2013; Mantere et al., 2013; Kemel et al., 2013a,b; Losada et al., 2013; Käpylä et al., 2013a,b,c; Svedin et al., 2013; Brandenburg et al., 2013a,b),

50 times in 2012 (Félix et al., 2012; Losada et al., 2012; Peter and Bingert, 2012; Lambrechts and Johansen, 2012; Kahniashvili et al., 2012; Tevzadze et al., 2012; Gent, 2012; Gibbons et al., 2012; Latter and Papaloizou, 2012; Hubbard, 2012; Gaburov et al., 2012; Yang and Krumholz, 2012; Lyra and Mac Low, 2012; McNally et al., 2012a,b; Bonanno et al., 2012; Haugen et al., 2012; Park and Blackman, 2012a,b; Mantere and Cole, 2012; Rogachevskii et al., 2012; Käpylä et al., 2012a,b; Maron et al., 2012; Horn et al., 2012; Lyra and Kuchner, 2012; Yang et al., 2012; Kitchatinov and Brandenburg, 2012; Brandenburg and Petrosyan, 2012; Hubbard and Brandenburg, 2012; Guerrero et al., 2012; Rice et al., 2012; Kemel et al., 2012a,b; Rheinhardt and Brandenburg, 2012; Peter et al., 2012; Brandenburg and Guerrero, 2012; Brandenburg et al., 2012a,b,c,d; Rempel et al., 2012; Del Sordo et al., 2012; Candelaresi and Brandenburg, 2012; Snellman et al., 2012a,b; Warnecke et al., 2012a,b,c; Johansen et al., 2012),

62 times in 2011 (Gastine and Dintrans, 2011a,b,c; Rice et al., 2011; Käpylä et al., 2011a,b,c; Mantere et al., 2011; Rogachevskii et al., 2011; Lambrechts, 2011; Johansen et al., 2011a,b; Rädler et al., 2011; Tarjei Jensen et al., 2011; Oishi and Mac Low, 2011; Ruoskanen et al., 2011; Fromang et al., 2011; Hydle Rivedal et al., 2011; Guerrero and Käpylä, 2011; Warnecke and Brandenburg, 2011b; Warnecke et al., 2011a,b; Kemel et al., 2011a,b,c; Bejarano et al., 2011; Zacharias et al., 2011a,b; Candelaresi and Brandenburg, 2011a,b; Candelaresi et al., 2011a,b,c; Del Sordo and Brandenburg, 2011a,b; Cantiello et al., 2011a,b; Rempel et al., 2011; Flock et al., 2011; Bingert and Peter, 2011; Käpylä and Korpi, 2011; Johansen et al., 2011c; Rüdiger et al., 2011; Lyra and Klahr, 2011; Mitra et al., 2011; Babkovskaia et al., 2011; Hubbard and Brandenburg, 2011; Chatterjee et al., 2011a,b,c; Chatterjee, 2011; Hubbard et al., 2011; Guerrero et al., 2011; Brandenburg and Nordlund, 2011; Warnecke and Brandenburg, 2011a; Brandenburg et al., 2011a,b,c; Brandenburg, 2011a,b,c,d),

31 times in 2010 (Haugen et al., 2010; Madarassy and Brandenburg, 2010; Gastine and Dintrans, 2010; Kahniashvili et al., 2010; Lyra et al., 2010; Johansen and Lacerda, 2010; Del Sordo et al., 2010; Fromang et al., 2010; Mitra et al., 2010a,b,c; Korpi et al., 2010; Käpylä et al., 2010a,b,c,d; Baggaley et al., 2010; Brandenburg and Dobler, 2010; Guerrero et al., 2010; Chatterjee et al., 2010; Rädler and Brandenburg, 2010; Bingert et al., 2010; Warnecke and Brandenburg, 2010; Hubbard and Brandenburg, 2010; Rheinhardt and Brandenburg, 2010; Brandenburg and Del Sordo, 2010; Brandenburg et al., 2010a,b; Brandenburg, 2010a,b),

35 times in 2009 (Yang et al., 2009; Baggaley et al., 2009; Rempel et al., 2009; Oishi and Mac Low, 2009; Snellman et al., 2009; Børve et al., 2009; Vermersch and Brandenburg, 2009; Heinemann and Papaloizou, 2009; Käpylä and Brandenburg, 2009; Johansen et al., 2009a,b; Maron and Mac Low, 2009; Zacharias et al., 2009a,b; Fromang et al., 2009; Mitra et al., 2009a,b; Käpylä et al., 2009a,b,c; Liljeström et al., 2009; Lyra et al., 2009a,b; Hubbard and Brandenburg, 2009; Sur and Brandenburg, 2009; Hubbard et al., 2009; Rädler and Brandenburg, 2009; Brandenburg et al., 2009a,b; Brandenburg, 2009a,b,c,d,e,f),

28 times in 2008 (Lyra et al., 2008a,b; Gastine and Dintrans, 2008a,b,c; Johansen and Levin, 2008; Workman and Armitage, 2008; Käpylä and Brandenburg, 2008; Klahr, 2008; Rieutord, 2008; Johansen et al., 2008; Yousef et al., 2008; Babkovskaia et al., 2008; Scharmer et al., 2008; Maron et al., 2008; Ruszkowski et al., 2008; Gellert et al., 2008; Rädler and Brandenburg, 2008; Tilgner and Brandenburg, 2008; Sur et al., 2008; Käpylä et al., 2008; Youdin and Johansen, 2008; Green et al., 2008; Brandenburg et al., 2008a,b,c; Brandenburg, 2008a,b),

19 times in 2007 (Käpylä and Brandenburg, 2007; Fromang et al., 2007; Fromang and Papaloizou, 2007; Oishi et al., 2007; Heinemann et al., 2007; Brandenburg and Käpylä, 2007; Schekochihin et al., 2007; Gustafsson et al., 2007; Ruszkowski et al., 2007; Johansen and Youdin, 2007; Youdin and Johansen, 2007; Johansen et al., 2007a,b; Sur et al., 2007; Brandenburg and Subramanian, 2007; Brandenburg et al., 2007a,b; Brandenburg, 2007a,b),

18 times in 2006 (Ouyed et al., 2006; Hupfer et al., 2006; Fromang et al., 2006; de Val-Borro et al., 2006; Haugen and Brandenburg, 2006; Johansen et al., 2006a,b,c; Shukurov et al., 2006; Mee

and Brandenburg, 2006; Snodin et al., 2006; Brandenburg and Dintrans, 2006; Gustafsson et al., 2006; Heinemann et al., 2006; Dobler et al., 2006; Brandenburg, 2006a,b,c),

18 times in 2005 (Johansen and Klahr, 2005; McMillan and Sarson, 2005; Schekochihin et al., 2005; Dorch, 2005; Johansen et al., 2005; Christensson et al., 2005; Brandenburg and Rüdiger, 2005; Brandenburg and Blackman, 2005; Brandenburg and Käpylä, 2005; Brandenburg and Subramanian, 2005a,b,c; Brandenburg et al., 2005a,b; Brandenburg, 2005a; Brandenburg et al., 2005c; Brandenburg, 2005b,c,d),

20 times in 2004 (Nordlund, 2004; Brandenburg and Sandin, 2004; Brandenburg and Multamäki, 2004; Dorch, 2004a,b; Haugen and Brandenburg, 2004a,b; Haugen et al., 2004a,b,c; Yousef et al., 2004; Johansen et al., 2004; Maron et al., 2004; Pearson et al., 2004; Brandenburg and Matthaeus, 2004; Dobler and Getling, 2004; Brandenburg et al., 2004a,b,c),

and 7 times in 2003 (Yousef et al., 2003; Yousef and Brandenburg, 2003; McMillan and Sarson, 2003; Haugen et al., 2003; Brandenburg, 2003; Brandenburg et al., 2003; Dobler et al., 2003).

2 Papers by topic

The Pencil Code has been used for the following research topics

1. **Interstellar and intercluster medium as well as early Universe**

   (a) *Interstellar and intercluster medium* (Li and Mattsson, 2020; Brandenburg and Furuya, 2020; Brandenburg and Brüggen, 2020; Gent et al., 2020; Evirgen and Gent, 2019; Evirgen et al., 2019; Seta and Beck, 2019; Rodrigues et al., 2019; Brandenburg, 2019a; Väisälä et al., 2018; Zhang et al., 2018b; Zhang and Yan, 2018; Hollins et al., 2017; Hord et al., 2017; Chamandy, 2016; Chamandy et al., 2016; Rodrigues et al., 2016; Chamandy et al., 2013; Gent et al., 2013a,b; Bykov et al., 2013; Gent, 2012; Yang and Krumholz, 2012; Mantere and Cole, 2012; Rogachevskii et al., 2012; Ruoskanen et al., 2011; Ruszkowski et al., 2007, 2008; Brandenburg et al., 2007b; Gustafsson et al., 2006, 2007; Brandenburg et al., 2005a; Haugen et al., 2004b; Brandenburg et al., 2003).

   (b) *Small-scale dynamos and reconnection* (Pusztai et al., 2020; Seta et al., 2020; Santos-Lima et al., 2020; Käpylä, 2019; Rüdiger et al., 2019b; Bhat et al., 2019; Brandenburg and Rempel, 2019; Brandenburg et al., 2018b; Käpylä et al., 2018; Bhat et al., 2016b; Bhat and Subramanian, 2013; Brandenburg, 2011c; Baggaley et al., 2009, 2010; Schekochihin et al., 2005, 2007; Haugen and Brandenburg, 2004b; Haugen et al., 2003, 2004a,c; Dobler et al., 2003).

   (c) *Primordial magnetic fields and decaying turbulence* (Brandenburg, 2020a; Brandenburg et al., 2020b, 2019b; Kahniashvili et al., 2020; Brandenburg et al., 2018a; Trivedi et al., 2018; Brandenburg et al., 2017b; Brandenburg and Kahniashvili, 2017; Kahniashvili et al., 2017; Reppin and Banerjee, 2017; Park, 2017; Osano and Adams, 2017; Adams and Osano, 2016; Osano and Adams, 2016b,a; Kahniashvili et al., 2016; Brandenburg et al., 2015; Adams and Osano, 2014; Kahniashvili et al., 2012, 2013; Tevzadze et al., 2012; Candelaresi and Brandenburg, 2011a; Kahniashvili et al., 2010; Del Sordo et al., 2010; Christensson et al., 2005; Yousef et al., 2004).

   (d) *Gravitational waves from turbulent sources* (Roper Pol et al., 2019, 2020).

2. **Planet formation and inertial particles**

   (a) *Planet formation* (Yang and Zhu, 2020; Eriksson et al., 2020; Gerbig et al., 2020; Castrejon et al., 2019; Baehr and Klahr, 2019; McNally et al., 2018; Schreiber and Klahr, 2018; Hernandez et al., 2019; Manser et al., 2019; Yang et al., 2018; Rice and Nayakshin, 2018; Richert et al., 2018; Kuchner et al., 2018; Baehr et al., 2017; Lyra et al., 2016; Yang and Johansen, 2016; Lambrechts et al., 2016; Johansen et al., 2015; Richert et al., 2015; Gibbons et al., 2015; Baehr and Klahr, 2015; Carrera et al., 2015, 2014; Yang and Johansen, 2014a,b; McNally et al., 2014; Turner et al., 2014; Gibbons et al., 2014; Dittrich et al., 2014, 2013; Hubbard, 2013; Lyra and Kuchner, 2013; Gibbons et al., 2012; Hubbard, 2012; Horn et al., 2012; Lyra and Kuchner, 2012; Yang et al., 2012; Lambrechts and Johansen, 2012; Johansen et al., 2012; Fromang et al., 2011; Johansen et al., 2011c; Lambrechts, 2011; Johansen et al., 2011a,b; Lyra and Klahr, 2011; Lyra et al., 2010; Johansen and Lacerda, 2010; Yang et al., 2009; Johansen et al., 2009b; Oishi and Mac Low, 2009; Børve et al., 2009; Lyra et al., 2009a,b, 2008a; Johansen et al., 2008; Lyra et al., 2008b; Youdin and Johansen, 2008; Oishi et al., 2007; Johansen et al., 2007a,b; Johansen and Youdin, 2007; Youdin and Johansen, 2007; Johansen et al., 2006a,b,c; Johansen and Klahr, 2005; Johansen et al., 2004, 2005).

   (b) *Inertial, tracer particles, & passive scalars* (Bhatnagar, 2020; Li et al., 2020; Mattsson et al., 2019b; Gerbig et al., 2019; Li et al., 2019; Aarnes et al., 2019; Mattsson et al., 2019a; Hedvall and Mattsson, 2019; Li et al., 2018c; Lyra et al., 2018; Bhatnagar et al., 2018a; Schaffer et al., 2018; Mitra et al., 2018; Bhatnagar et al., 2018b; Yang et al., 2017; Aarnes et al., 2017; Sharma et al., 2017; Haugen et al., 2017; Li et al., 2017; Krüger et al., 2016; Raettig et al., 2015; Pan and Padoan, 2014, 2013; Pan et al., 2014b,a; Mitra et al., 2013; Haugen et al., 2012; Hydle Rivedal et al., 2011; Haugen et al., 2010).

3. **Accretion discs and shear flows**

   (a) *Accretion discs and shear flows* (Bhat et al., 2017; Singh et al., 2017; Lyra et al., 2017; Bhat et al., 2016a; Tian and Chen, 2016; Lyra, 2014; Lyra et al., 2015; Väisälä et al., 2014; Lyra, 2013; Raettig et al., 2013; Di Bernardo and Torkelsson, 2013; Latter and Papaloizou, 2012; Gaburov et al., 2012; Lyra and Mac Low, 2012; Rice et al., 2011, 2012; Oishi and Mac Low, 2011; Flock et al., 2011; Käpylä et al., 2010a; Käpylä and Korpi, 2011; Fromang et al., 2010; Korpi et al., 2010; Johansen et al., 2009a; Heinemann and Papaloizou, 2009; Fromang et al., 2009; Johansen and Levin, 2008; Workman and Armitage, 2008; Fromang et al., 2007; Fromang and Papaloizou, 2007; Ouyed et al., 2006; Brandenburg, 2005d).

(b) *Shear flows* (Singh and Jingade, 2015; Modestov et al., 2014; Vermersch and Brandenburg, 2009; Käpylä et al., 2009c; Green et al., 2008; Yousef et al., 2008; Babkovskaia et al., 2008; Brandenburg et al., 2004a).

4. **Solar physics**

(a) *Coronal heating and coronal mass ejections* (Adrover-González and Terradas, 2020; Bourdin, 2014, 2017, 2020; Bourdin et al., 2013a,b, 2014, 2015, 2016; Chatterjee, 2020; Warnecke and Bingert, 2020; Candelaresi et al., 2019; Warnecke and Peter, 2019b; Smiet et al., 2019; Warnecke and Peter, 2019a; Korsós et al., 2018; Cameron et al., 2017; Chatterjee et al., 2016; Candelaresi et al., 2016; Threlfall et al., 2016; Chen et al., 2015; Smiet et al., 2015; Warnecke and Brandenburg, 2014; van Wettum et al., 2013; Bingert and Peter, 2013; Peter and Bingert, 2012; Peter et al., 2012; Warnecke et al., 2012a,b; Warnecke and Brandenburg, 2011a; Zacharias et al., 2011a,b; Warnecke et al., 2011b; Bingert and Peter, 2011; Warnecke and Brandenburg, 2011b; Warnecke et al., 2011a; Warnecke and Brandenburg, 2010; Bingert et al., 2010; Zacharias et al., 2009b,a).

(b) *Helical dynamos, helical turbulence, and catastrophic quenching* (Brandenburg and Scannapieco, 2020; Park, 2019a; Peng et al., 2019; Nauman and Nättilä, 2019; Park, 2019b; Brandenburg and Oughton, 2018; Hofer and Bourdin, 2019; Bourdin et al., 2018; Bourdin and Brandenburg, 2018; Brandenburg, 2018; Brandenburg and Chatterjee, 2018; Rempel et al., 2019; Brandenburg et al., 2017c,a,d; Rempel et al., 2017; Smiet et al., 2017; Cole et al., 2016; Karak and Brandenburg, 2016; Karak et al., 2015b; Brandenburg and Hubbard, 2015; Subramanian and Brandenburg, 2014; Brandenburg and Stepanov, 2014; Brandenburg, 2014; Bhat et al., 2014; Chian et al., 2014; Park, 2014b; Park et al., 2013; Brandenburg and Lazarian, 2013; Park, 2013b,a, 2014a; Candelaresi and Brandenburg, 2013a; Park, 2013a; Del Sordo et al., 2013; Brandenburg, 2013; Rempel et al., 2013; Candelaresi and Brandenburg, 2013b, 2012; Brandenburg et al., 2012d; Rempel et al., 2012; Park and Blackman, 2012b,a; Brandenburg and Guerrero, 2012; Brandenburg, 2011a; Hubbard and Brandenburg, 2012; Rempel et al., 2011; Mitra et al., 2011; Candelaresi et al., 2011b; Hubbard and Brandenburg, 2011; Brandenburg, 2011b; Chatterjee et al., 2011a; Hubbard et al., 2011; Candelaresi et al., 2011c; Candelaresi and Brandenburg, 2011b; Candelaresi et al., 2011a; Brandenburg, 2011d; Guerrero et al., 2011; Hubbard and Brandenburg, 2010; Mitra et al., 2010a,b; Brandenburg, 2010b; Guerrero et al., 2010; Brandenburg, 2010a; Brandenburg et al., 2010a; Chatterjee et al., 2010; Rädler and Brandenburg, 2010; Rempel et al., 2009; Käpylä and Brandenburg, 2009; Brandenburg, 2009a,e; Brandenburg et al., 2009a; Brandenburg, 2009d,f; Sur and Brandenburg, 2009; Brandenburg, 2009b,c; Rädler and Brandenburg, 2008; Tilgner and Brandenburg, 2008; Brandenburg, 2008a; Brandenburg et al., 2008c; Brandenburg, 2008b; Brandenburg and Käpylä, 2007; Brandenburg and Subramanian, 2007; Brandenburg, 2007b,a, 2006c,b; Shukurov et al., 2006; Mee and Brandenburg, 2006; Snodin et al., 2006; Brandenburg and Dintrans, 2006; Brandenburg, 2006a; Brandenburg et al., 2005b; Brandenburg and Subramanian, 2005c,b; Brandenburg and

Käpylä, 2005; Brandenburg, 2005a; Brandenburg and Blackman, 2005; Brandenburg and Subramanian, 2005a; Brandenburg, 2005b,c; Brandenburg et al., 2004c; Brandenburg and Matthaeus, 2004; Brandenburg and Sandin, 2004; Yousef and Brandenburg, 2003).

(c) *Helioseismology* (Singh et al., 2014, 2015, 2020).

(d) *Strongly stratified MHD turbulence and NEMPI* (Losada et al., 2019; Perri and Brandenburg, 2018; Jabbari et al., 2017, 2016; Warnecke et al., 2016; Jabbari, 2015; Brandenburg et al., 2014; Losada et al., 2014; Mitra et al., 2014; Jabbari and Brandenburg, 2014; Jabbari et al., 2014, 2015; Brandenburg et al., 2013b; Warnecke et al., 2013c; Jabbari et al., 2013; Kemel et al., 2013a,b, 2012a,b, 2011a,b,c; Losada et al., 2013; Käpylä et al., 2013a; Losada et al., 2012; Käpylä et al., 2012a; Brandenburg et al., 2010b, 2011c, 2012a; Rüdiger et al., 2011).

(e) *Convection in Cartesian domains* (Brandenburg et al., 2019a; Käpylä, 2018; Bushby et al., 2018; Käpylä et al., 2017b; Félix et al., 2013; Käpylä et al., 2013b; Getling, 2013; Félix et al., 2012; Svedin et al., 2013; Guerrero et al., 2012; Gastine and Dintrans, 2011c; Mantere et al., 2011; Käpylä et al., 2011c; Guerrero and Käpylä, 2011; Cantiello et al., 2011a,b; Gastine and Dintrans, 2008a,b, 2010, 2011a,b; Brandenburg et al., 2011b; Käpylä et al., 2008, 2009b, 2010b; Scharmer et al., 2008; Rieutord, 2008; Heinemann et al., 2007, 2006; Nordlund, 2004; Dobler and Getling, 2004).

(f) *Global convection and dynamo simulations* (Navarrete et al., 2020; Jakab and Brandenburg, 2020; Viviani and Käpylä, 2020; Käpylä et al., 2020b; Viviani et al., 2019; Rüdiger et al., 2019a; Navarrete et al., 2019; Käpylä et al., 2019; Warnecke, 2018; Viviani et al., 2018; Käpylä et al., 2017a; Gent et al., 2017; Karak et al., 2015a; Warnecke et al., 2014; Cole et al., 2014; Käpylä et al., 2010d, 2011a,b, 2012b, 2013c, 2014; Mantere et al., 2013; Warnecke et al., 2012c, 2013a,b; Mitra et al., 2009b, 2010c; Brandenburg et al., 2007a; Dobler et al., 2006; McMillan and Sarson, 2005; Dorch, 2004a,b, 2005; McMillan and Sarson, 2003).

5. **Miscellanea**

(a) *Turbulent transport and test-field method* (Käpylä et al., 2020a; Brandenburg and Chen, 2020; Warnecke et al., 2018; Andrievsky et al., 2015; Snellman et al., 2015; Karak et al., 2014; Rheinhardt et al., 2014; Rüdiger and Brandenburg, 2014; Devlen et al., 2013; Brandenburg et al., 2004b, 2008a,b, 2009b, 2012b,c, 2013a; Brandenburg and Rädler, 2013; Snellman et al., 2009, 2012a,b; Kitchatinov and Brandenburg, 2012; Rheinhardt and Brandenburg, 2010, 2012; Rogachevskii et al., 2011; Rädler et al., 2011; Chatterjee, 2011; Brandenburg and Del Sordo, 2010; Madarassy and Brandenburg, 2010; Käpylä et al., 2010c; Hubbard and Brandenburg, 2009; Hubbard et al., 2009; Rädler and Brandenburg, 2009; Käpylä et al., 2009a; Mitra et al., 2009a; Liljeström et al., 2009; Sur et al., 2008; Käpylä and Brandenburg, 2007, 2008; Sur et al., 2007; Hupfer et al., 2006; Yousef et al., 2003).

(b) *Hydrodynamic and MHD instabilities* (Del Sordo et al., 2012; Chatterjee et al., 2011b,c; Bejarano et al., 2011; Brandenburg and Rüdiger, 2005; Brandenburg et al., 2004c; Brandenburg, 2003).

(c) *Chiral MHD* (Brandenburg et al., 2017e; Schober et al., 2018, 2019, 2020a,b).

(d) *Hydrodynamic and MHD turbulence* (Brandenburg and Boldyrev, 2020; Aiyer et al., 2017; Yokoi and Brandenburg, 2016; Brandenburg and Petrosyan, 2012; Del Sordo and Brandenburg, 2011a,b; Brandenburg and Nordlund, 2011; Haugen and Brandenburg, 2004a, 2006; Brandenburg et al., 2005c; Pearson et al., 2004).

(e) *Turbulent combustion, front propagation, radiation & ionization* (Zhang et al., 2020; Aarnes et al., 2020; Brandenburg and Das, 2020; Qian et al., 2020; Brandenburg, 2020b, 2019b; Mao et al., 2019; Bhat and Brandenburg, 2016; Babkovskaia et al., 2015; Chaudhuri, 2015; Barekat and Brandenburg, 2014; Tarjei Jensen et al., 2011; Brandenburg et al., 2011a; Babkovskaia et al., 2011; Brandenburg and Multamäki, 2004).

(f) *Code development, GPU etc* (Pekkilä et al., 2017).

3 Code comparison & reference

The Pencil Code has been quoted in other papers either for detailed code comparison, in connection with related work, or in comparison with other codes (Guerrero, 2020; Gressel and Elstner, 2020; Matilsky and Toomre, 2020; Brandenburg et al., 2020a; Beresnyak, 2019; Sapetina et al., 2019; Rosswog, 2019a,b; Mignone et al., 2019; Tricco, 2019; Jóhannesson et al., 2019; Porter et al., 2019; Zhang et al., 2018a; Li et al., 2018a; Nixon et al., 2018; Rüdiger et al., 2018; Hernandez et al., 2018; Oishi et al., 2018; Augustson, 2017a; Yamamoto and Makino, 2017; Goffrey et al., 2017; Augustson, 2017b; Ryu and Huynh, 2017; Cabezón et al., 2017; Emeriau-Viard and Brun, 2017; Brun and Browning, 2017; Kupka and Muthsam, 2017; Kulikov et al., 2016; Surville et al., 2016; Simon et al., 2016; Skála et al., 2015; Mocz et al., 2015; Hopkins, 2015; Duffell and MacFadyen, 2015; Krumholz and Forbes, 2015; Cheung et al., 2015; Augustson et al., 2015; Schad et al., 2015; Brun et al., 2015; Norton et al., 2014; Rieutord, 2014; Olshevsky et al., 2014; Skála et al., 2014; Jenkins et al., 2014; Lovelace and Romanova, 2014; Recchi, 2014; Berera and Linkmann, 2014; Norton et al., 2014; Charbonneau, 2014, 2013; Augustson et al., 2013; Gabbasov et al., 2013; Kulikov, 2013; Fromang, 2013; Martínez Pillet, 2013; Cavecchi et al., 2013; Rein, 2012; Freytag et al., 2012; McNally et al., 2012a; Bonanno et al., 2012; Maron et al., 2012; McNally et al., 2012b; Andic, 2011; Viallet et al., 2011; McNally, 2011; Vshivkov et al., 2011; Ziegler, 2011; Hanasz et al., 2010; Brandenburg and Dobler, 2010; Rovithis-Livaniou, 2010; Bai and Stone, 2010; Stone and Gardiner, 2010; Turck-Chièze, 2010; Garcia de Andrade, 2009; Kley, 2009; Piontek et al., 2009; Maron and Mac Low, 2009; Hawley, 2009; Lemaster and Stone, 2009; Matsumoto and Seki, 2008; Maron et al., 2008; Gellert et al., 2008; Klahr, 2008; Thévenin et al., 2006; Fromang et al., 2006; de Val-Borro et al., 2006; Turner et al., 2006; Rüdiger, 2005; Maron et al., 2004).

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